

Psychological Bulletin

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Psychological Bulletin

SURVEY OF RESEARCH WITH PSYCHOLOGICAL TESTS IN INDIA

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Within the compass of this article, it is impossible to deal with all the aspects of psychological work now going on in India. Largely because of the interests of the writer, the main emphasis in this summary and critique will be on current research in the area of psychological tests although other areas will be treated. Omitted here is the large volume of work in social psychology, most of which stems from the pioneering work of the Unesco Tensions Project in 1950 for which Gardner Murphy was the consultant. Murphy's recent American publication (22), summarizing this research, is easily available to United States readers; consequently it will not be summarized here.

The Indian psychological scene is difficult to summarize in a few words. The orientation is still quite British, largely because the older psychologists, who could afford to go abroad for graduate training, either went to London or to Edinburgh. Here they met the statistical and cognitive traditions of Spearman and Thomson. Consequently, one still finds in India

much preoccupation with tests of *g* and practically no diagnostic work. Alexander's Passalong Test (1) is widely used; Cox's mechanical ability measures (12) are also well known and used. The psychological pole is now definitely shifting toward the United States with the result that there is more interest in "applied" problems and projective tests. Three clear psychological lines are now evident: (a) psychological testing for school use—intelligence, achievement, aptitude; (b) studies with applied problems—such as industrial fatigue, research on tests for worker selection, social psychology problems (largely via questionnaires) and tensions between social groups and classes; (c) clinical, taking the form of a preoccupation with the Rorschach and TAT. Such clinical testing is typically in the hands of poorly trained individuals; "experts" are apt to appear on the scene after one reading of Klopfer and Kelly; there are as many "local adaptations" of the TAT as there are schools where this type of research secures sponsorship. The situation in this respect is such that one of the recommendations of the members of the workshop in educational-vocational guidance, led by the writer in Delhi in the spring of 1953, stated that "projective techniques should be used only by specially trained persons" (5, p. 42).

¹ The author was a Fulbright Visiting Professor in Psychology and Vocational Guidance at the Central Institute of Education, Delhi, India, for the academic year 1952-53. All "current" comments relate to this period. During the year the writer travelled extensively and managed to visit all the important universities where psychology is taught.

Departments of psychology are still largely under the dominance of philosophy. The situation in this regard is much like that in the United States before World War I. There are two or three universities in India which can now boast of autonomous psychology departments. What few published Indian textbooks there are in psychology (almost all in English, such being the medium of practically all university education) reflect the old partnership with philosophy. Recent texts to some extent shift away from the functional-structural content and are apt to deal with more "applied" problems; still, the old tradition dies hard. McDougall is still very much in evidence. One of the most recent texts (15), published in 1952, still is based on a highly eclectic approach that attempts to straddle both the philosophical as well as psychological guideposts: beginning with a discussion of the mind-body problem, it moves on to the area of the physiological (nervous system, receptors, sensation and perception), attention, memory, imagination, feeling and emotion, instincts (the McDougall treatment), learning (conditioning is discussed but in the light only of Pavlov and Watson), sentiments, mental measurements (mostly IQ), abnormal psychology, and parapsychology.³ Contrary to other texts, this book is excellently printed and would sell for something like \$3.50 in United States currency—a high price for most students and teachers to pay.

The great preoccupation, however,

³ I expected to find a good deal of interest in this area and in the works of Rhine. Quite the contrary, few Indian psychologists seemed to know much about it. I attributed this to the tardiness of "current" psychological data being absorbed by Indian workers despite the availability of many recent American journals.

is still with the IQ and mental tests. There is little awareness of the more basic problems and theoretical contributions from America as regards learning and motivation theory. Statistics, in line with the cognitive emphasis from Great Britain, is much developed, particularly factor analysis. Murphy, during his stay in India under the auspices of Unesco, was requested by the Ministry of Education of the Government of India to be the leader of a conference of Indian psychologists who drew up excellent recommendations for the teaching of psychology and for "modernizing" the typical university set-ups. Committees of several types were appointed, ostensibly to continue on the basis of this groundwork. It is disappointing to report that the original enthusiasm generated by these group discussions, out of which some realistic and relatively inexpensive programs were suggested, has as yet resulted in very little practical action.

Psychology training for Indian students is still largely confined to the graduate level. Most undergraduates get only one course in educational psychology and practically nothing else in social science. Heavy doses of philosophy and history are administered instead. The result is that students at the MA level, typically in schools of education (where they get their first taste of psychology), are ill-prepared for any advanced work. They have little idea of what an experiment is, let alone how to design one; no understanding of elementary statistics; little appreciation of the social forces shaping their own country. But they are willing and avid and eager and, more and more, so it seemed to this writer, to be looking to the United States for "practical" answers to tough

problems in social science. The United States, from the point of view of training in psychology, is now looked upon fairly universally in India as an "open sesame." Most serious students hope to obtain an American scholarship; in the fall of 1952, the U. S. Educational Foundation in India received approximately 3,000 applications for about 30 Fulbright student grants for graduate study in America and for all areas of graduate training.

Still, there is much good work being done in India although it seemed to this writer to be heavily on the side of IQ testing and tests of *g*. But there is much interest in American developments and earnest attempts are made to adapt foreign materials to the local scene. Some of this has been wisely called into question; more sophisticated workers are beginning to sound the call that tests transposed from Western cultures rarely work out satisfactorily (25); Dayal (13) has urged more centralized research in the construction of psychological tests in India and has complained about the overlapping or unnecessary duplication in psychometric research.

The start of work in psychological testing was the project by Rice in Lahore (now situated in Pakistan) which was begun in 1922. Rice was a missionary who early saw the need for a measure of intelligence in mission schools and elsewhere. His pioneer work (27), still in use for measurement purposes in many parts of Northern India today, was an Indian language (Hindustani and Punjabi) version of the Terman 1916 revision of the Binet scale with the addition of some nonverbal items from Pintner and Paterson. This is a point-scale adaptation standardized on 929 school boys, 5 to 16 years

of age from 37 different schools and six caste groups. Later protocols were added so that the final table of point scores and MA equivalents is based on an *N* of 1,388 (27, p. 72).³

Thirty-five test items, including nine nonverbal ones, comprise the scale. A Brief Scale of 10 items is provided; it is also possible to employ the nonverbal items as a separate scale but only for cases where there is an obvious linguistic difficulty. Early attempts were made to construct an age scale and this early age scale correlated .98 with the final point scale. The Punjabi version is equivalent phrase by phrase to the Hindustani; only 27 new words had to be introduced for the entire scale so that a separate standardization was therefore not involved. Inspection of Rice's statistical tables shows that the mean or median IQ's for ages 5-16 all cluster around 100 fairly well. There is, however, considerably more variability (σ of 25.95, calculated by the writer from Rice's data) than Terman reported. Rice attributes this to chance errors of both measurement and in the CA's (age data in India present far more difficulties than in western countries). Point scores show the expected increase with CA; test-retest data for 111 cases over a two-year interval gave a correlation of .86 (27, p. 140). On the average there was a gain of 7.5 IQ points on such retests, increases being greater where less experienced examiners conducted the

³ In the writer's extensive travels in India, he never came across a full text of this work. Various mimeographed copies of the test instructions only were available and these were being used indiscriminately for all types of subjects in many parts of India. It was not until the writer's return to the United States that a copy of the full text became available so that the statistical data might be examined.

first tests. Attempts were made to employ outside validity checks: the r between test scores and school marks categorized into five groups for 630 cases was .25 (Rice believes that, because of the character of the Indian school organization, this is possibly as significant as the .45 value reported by Terman).

Part III of Rice's work discusses test results with "Depressed Classes" or Untouchables. A good deal of statistical care went into this section. Results are reported for a selected group of 500 (50 from each of 5 caste groups matched for both age and school progress; 50 from each of the caste groups matched only for age). Here four of the five groups tested scored approximately 100; Brahmins, the Hindu intellectual aristocracy, averaged 107 (27, p. 173). Unfortunately, it was not possible to match on the triple basis of age, grade, and years of schooling. Rice's general conclusion is that there is no essential inferiority in the Depressed Class group and that the differences found between the other four caste groups were slight.

A somewhat more sophisticated test is the version of the 1937 Terman-Merrill scale by Kamat in Bombay done under the sponsorship of Godfrey Thomson in Great Britain. (16). Owing to the language problem in India, this scale may be profitably used only within certain states in and around Bombay. Kamat's work uses the age scale of Binet and is available in two languages: Kannada (N of the standardization group = 739) and Marathi (N = 335). The two standardization groups were located in a middle-sized town of 30,000 population in Bombay State; the author states that the sample is "fairly representative of the general population of Indian children" (16,

p. 45). The MA levels for the test items were assigned by the method advocated by Cyril Burt, i.e., a test passed by 50 per cent of all six and seven year olds is assigned to VII. Inspection of Kamat's tables shows that, in the main, the mean IQ's for the various age groups are very close to 100 but the SD for the entire standardization group of 1,074 children is 18.7. The final scale comprises 13 age groups against Terman's 12; 99 individual tests as against Terman's 90. The validity of the scale as a whole was checked against secondary school teacher estimates; the author remarks this was "nearly .5, which is fairly high considering the variability of teachers' estimates" (16, p. 71). Primary school teachers were found to know so little about the children in their classes as to make their ratings useless.

In this introductory summary of psychological tests in India, it would be remiss to omit the useful work of E. W. Menzel (19). Menzel is associated with an American mission school and is noted in India for his consultant work in connection with tests for secondary school use in the State of Madras. His useful book, summarizing much research with aptitude and achievement tests, has gone through three editions. He has done an excellent job of collecting scattered materials in a country where communication among research workers is very poor, but one reads this volume with disappointment because of the lack of validity data cited (because they are not available) and there is not a single mention of any attempt at cross validation. Menzel, however, has done an enormous service to India in presenting and summarizing this work, thereby making himself practically a one-

man communication team for other interested workers in the field. He is also astute about the problem of translating foreign tests into local Indian languages, stressing the need for local norms, for detailed instructions to examinees (more detailed than needed in the United States), and for less emphasis on speed (20).

The lack of communication among research workers in India, along with the minute financial help that is available, is a little appalling to the outside observer. The annual Indian Science Congress schedules a few papers on psychology, but there is no national psychological association despite the many practitioners. Psychological journals are few and are apt to appear irregularly—again, finances—and do not receive the wide circulation that comparable journals do in the United States or Great Britain. The Southeast Asia Office of Unesco (in New Delhi) has begun in 1953 the much needed job of an annotated bibliography of all psychological articles published in Indian journals.

Of the journals, the oldest and best known is the *Indian Journal of Psychology* published by the Department of Psychology of Calcutta University. Formerly this was issued several times a year, but now it appears rather irregularly. *Shiksha* (published in Lucknow) and the *Indian Journal of Educational Research* (Bombay) also present material in the testing field. Other journals are largely devoted to education but, from time to time, do publish articles devoted to strict psychological concern: the *Journal of Education and Psychology* (published in Baroda) and the *Punjab Education Journal* (Jullundur) are two examples. *Teaching*, an excellently printed quarterly put out by the Oxford University Press, Bom-

bay, while largely devoted to education problems, also carries significant articles in the field of psychology. An important newcomer on the horizon is the *Journal of Vocational and Educational Guidance* (Bombay), the first issue of which appeared in January, 1954. American readers will find most of these journals listed in *Psychological Abstracts*. All of them are in English, still the language of the universities and of academic communication generally.

Aside from these general remarks, it is easier to summarize the main developments in psychological testing and other areas by reference to specific locales which the writer visited during his year in India.

CALCUTTA

Department of Psychology, Calcutta University. Here the first psychological laboratory in India was organized in 1916 for graduate students under the direction of Dr. N. N. Sengupta after his return from Harvard where he studied under Munsterberg. The impetus toward the organization of the Applied Psychology Section was aided by the presence of foreign psychologists (Myers, Spearman, Jung) during the Silver Jubilee Session of the Indian Science Congress in 1938. For many years Dr. G. Bose was the head of the Department of Psychology and he brought an interest in clinical as well as other applied problems. With the retirement of Bose, Dr. S. C. Mitra (Ph.D., Leipzig) took over the chairmanship of the Department and through his efforts the Applied Psychology Section has been further strengthened. Students of the department may specialize in clinical, industrial-vocational, or educational psychology.

S. K. Bose (trained under Likert at

Michigan) is in charge of the Applied Psychology Section at the present time. The work of this section now consists of research with psychological tests, educational and vocational guidance, clinical examination of mentally deficient or emotionally maladjusted children, work in the field of industrial human relations, student training (31).

Vocational and educational counseling is available for both students and members of the outside community. A standard test battery is used, which takes about eight hours, and a standard fee is charged; for the clinical examinations, a higher fee is charged.

The Terman-Merrill Scales (L and M) have been adapted and are administered in Bengali; present versions are the result of item analyses with both forms and these 1952 revisions were being tried out on new samples (31, p. 5). Concrete intelligence is measured by a battery of performance tests (Alexander's Pass-along,⁴ Dearborn Formboard, Kohs Blocks, and a special cube construction test developed locally). There is also a variety of special aptitude tests which will be familiar to American readers: the Stenquist Mechanical Assembly, adapted to local conditions; a nut and bolt test; a manual dexterity test; a test of constructional ability.

Tests of temperament comprise the following: (a) an inventory of 30 paired questions, the scoring of which provides a self-estimate of the examinee and which is based upon the Subjective Paired Word Test of the National Institute of Industrial Psychology in England; (b) a paper-and-pencil test of introversion-extroversion and a word association test, both locally developed; (c) a neurotic

inventory prepared at Calcutta with clinical weights subjectively determined (9). Bhattacharya (8), one of the staff at Calcutta, has, however, published data to show that all of these indices have low reliabilities and are in need of revision. Both the Rorschach and TAT are being tried. The first TAT version was administered to some 200 students along with a standard personality inventory with a positive correlation resulting. Consequently a second set of Indianized pictures has been prepared by S. K. Bose and is now being tried.

For testing scholastic ability, three tests of reading, dictation writing, and arithmetic are employed. In addition, a physical and psychological examination (reaction time, sustained attention, steadiness, fatigability) is conducted.

The Section in 1952 was engaged in the adaptation of the Wechsler-Bellevue scales (I and II) and in the determination of norms for Indian children for Raven's Colored Matrix Test. Age norms for different performance tests have been prepared and published (31) but only mean scores are supplied.⁵ An engineering aptitude test and a clerical aptitude test have been constructed and are being standardized.

Individual members of the Department conduct special research projects. S. K. Bose has engaged in studies of employee attitudes and job satisfaction in several industries using the Likert-type scales (10). One of these employee attitude scales (it happened to be the Thurstone type) shown to the writer consisted of some 20 statements, printed both in Hindi and Bengali to ease the language problem; with illiterates, an inter-

⁴ An ingenious group version of the Pass-along has been developed by G. Bose.

⁵ I saw very few cumulative percentile curves in India; "norms" typically refer only to average scores.

view is held with the worker in which all the topics on the scale are covered, the interviewer then filling out the scale at the end. The Ministry of Education, Government of India, has offered financial assistance for this work. Bose has also conducted a study of accident-prone tram and bus drivers under a grant from the Indian Council of Medical Research (11). S. P. Ghosh, a recent Calcutta Ph.D., has developed test batteries for semiskilled (manual) and skilled (mechanical) workers, criteria for which were ratings by supervisors as well as output. S. N. Roy (another recent Calcutta Ph.D.) has worked in the field of job analysis and was contacting successful people in medicine, law, engineering, accountancy, journalism, and teaching for information about training requirements and temperamental qualities needed for these jobs. S. C. Bisi was engaged in a job analysis of overseers connected with the engineering profession.

Possibly because of its favorable location in Calcutta, the Section also conducts research on employee selection for various industrial firms. A general assessment battery is administered and candidates are then rated "A" to "D," such ratings being returned to the firm with recommendations (hire or not) from the Section. Follow-up studies have also been attempted.

Department of Anthropology, Government of India. Under the direction of Dr. B. S. Guha, this government agency is composed of several branches: physical and social anthropology, psychology, human biology, nutrition, statistics, X-ray. The Department is housed in spacious quarters in the Indian Museum in downtown Calcutta; there is an excellent library which contains many American psychological journals. The organization and history of the

Department have already been described for American readers (3). Comments here will be restricted to psychological work. Psychological trainees are selected by various state governments. A certificate is given at the conclusion but no degree.

Dr. Uma Chowdhury (a recent Ph.D. from Calcutta) is in charge of most of the psychological work. Her main work has been in connection with a Department team, Unesco sponsored, which conducted a community study of an urban and village area in Bengal (Northeastern India). Chowdhury was responsible for the administration of the psychological tests used (TAT, Rorschach, Horn-Hellersberg, Wechsler-Bellevue, an ethical judgment scale). She reported that nearly all the Wechsler items needed to be changed and several revisions have been made. In late 1952, I checked through the recent changes made in this Bengali version. All the physical aspects of the revision (box, line drawings, photographs used) were well done. The test was not a mere translation of Wechsler items into Bengali. Vocabulary and Picture Arrangement were altered the most. Some 300 protocols for ages 8-25 were collected; an item analysis was contemplated as the next step before arriving at the final adaptation of the scale. There is still a shortage of adequate records for boys. The interesting comment was made that girls, after marriage, appeared to show "deterioration," i.e., they then cease to move in as stimulating an environment as before, when they were in school.

BOMBAY

Parsi Panchayet Vocational Guidance Bureau. This bureau is part of a larger social service agency known as the Offices of the Trustees of the Parsi

Panchayet Funds and Properties, an organization which conducts various welfare activities for the Parsi community (such as housing, medical aid, scholarship and financial aid, employment, nursery schools, home for the aged). The Vocational Guidance Bureau, established in 1947, is only one of these welfare activities; guidance services, however, are available to members of all communities rather than only Parsis. The Bureau is under the direction of Dr. H. P. Mehta (Ph.D., Columbia). It receives cases from various sources: from social workers attached to the parent body and from other Bombay social agencies, from psychiatrists and doctors for assessment of general intelligence of cases suspected of mental deficiency, from the Employment Bureau for a study of specific aptitudes of clients needing placement, from the nursery school in regard to behavior problem cases. Students in search of vocational guidance are generally self-referrals. The Bureau also conducts testing and guidance programs for boys and girls in the final class of certain Bombay high schools. Not surprisingly, it was reported that vocational guidance consultations were usually complicated by other problems, such as personal, social, economic difficulties. Fees are charged and are adjusted to ability to pay.

The Bureau lays emphasis on counseling and individualized work. Considerable time is devoted to each client. The general approach is non-directive. Tests are not administered in the form of a standard battery given to all clients; instead aptitude tests are used according to the needs of the situation. The vocational plan is jointly arrived at by client and counselor.

Most of the aptitude tests utilized are originally American, but they

have been restandardized on local samples. In general, American norms have proven too "high" or else it has been necessary to extend the time limits.

A significant step forward has recently been taken by the Bureau in sponsoring the new *Journal of Vocational and Educational Guidance*. One of the great needs in India is that of communication among various workers in the field, and it is hoped that this journal will fill the present gap. The first issue contains two articles by the present writer on the vocational guidance situation in India (4, 5), an article on the work of the Vocational Guidance Bureau of Bombay State (see below), an article providing national unemployment statistics from the Ministry of Labour, a reprint of Super's article (30) dealing with the self-concept of vocational adjustment, an occupational information piece on the legal profession, a general plea for more vocational guidance in the secondary schools taken from the Report of the Secondary Education Commission for the Government of India in 1953, an article dealing with the need for age-grade norms—all in all, a rather auspicious beginning. The editor is Dr. H. P. Mehta.

Vocational Guidance Bureau, Bombay State. Whereas the Bureau operated by the Parsi Panchayet Trust is a private agency, the State of Bombay established its own vocational guidance bureau in 1950 with the following objectives: (a) the collection and dissemination of occupational information, (b) the preparation of a cumulative record card for use in secondary schools which, as of the spring of 1953, has been sent to the Government of Bombay for approval; (c) the standardization of certain psychological tests for school use. The Bureau is under the direc-

tion of F. S. Chothia (Harvard trained).

Concentration has been largely directed toward the first objective, since this was felt to be the greatest need at the outset. Accordingly, the Bureau has published some seven pamphlets and prepared a series of 33 career monographs. Typical topics include social work, radio, engineering specialties, fisheries, police force, mining-metallurgy-geology. Career conferences have been arranged for both secondary school students as well as college students; these have been held in various cities throughout Bombay State. The Bureau has prepared a number of posters for school use; radio talks and lectures are given by the Bureau's staff. With the help of the Bureau, a documentary film on vocational guidance was produced by the Government of India Films Division and is now available for use by all interested organizations.

The Bureau realizes that effective work in vocational guidance can only be done if schools and colleges have a staff member trained in this specialty. With this in mind, the Bureau conducts what are termed Career Master courses. Since 1951 (and up to the spring of 1953) six conferences were held for secondary school teachers; in addition, one has been held for college personnel. Over 200 individuals have completed the courses, which consist of about 30 lectures in addition to some experience in psychological testing and visits to Bombay institutions. It is expected that when they return to their own schools they will set up Career Information Centers. To keep the alumni in touch with recent developments, a monthly newsletter is sent out.

In connection with the third objective, various psychological tests, mostly of American origin, have been

adapted and restandardized. The Bureau is interested in doing follow-up studies with certain of these tests after they have been administered to entering first-year professional school students. A battery consisting of the DAT Abstract Reasoning, Bennett Mechanical, and Revised Paper Form Board has been given to students in engineering, architecture, and medical schools. Students at two technical high schools have also been tested. The data are too detailed for presentation here. Suffice it to say that the tests have proved to be efficient predictors and, in some cases, better predictors than the usual entrance (essay-type) examinations. The plan is to follow up these students until the completion of their training.

PATNA

Department of Applied Psychology, Institute of Psychological Research and Service. This division of the University was until the fall of 1953 under the direction of Professor H. P. Maiti, who has recently been in the United States. A personal communication from him has informed the writer of a change in policy in relation to the Institute, with the result that many of its activities have been suspended and Professor Maiti has shifted to a new position at the Institute of Development at Ahmedabad. S. K. Mitra, who during 1952-53 was at the University of Chicago for training in clinical psychology, is apparently second in command. He appears to have been responsible for much of the research on the Rorschach (21) and other clinical tests at Patna. The following description of the work at Patna may have radically changed. What follows is a picture of activities as of the academic year of 1952-53.

The Institute was housed in its own building and was engaged in teach-

ing, research, and service. In its teaching function, students received training for an M.A. degree in applied psychology (industrial or educational). The research and service functions were mostly confined to guidance and counseling, although there was some work in progress in therapy. The largest number of clients, both students and non-university people, comes for personal counseling and for vocational guidance. Student clients are largely at the B.A. stage and want to know what professional career is most suitable for them. The orientation of the Institute's staff was largely psychoanalytic and dynamic; consequently a good deal of stress was laid on clinical tests (especially projective ones). The common types of aptitude tests were also in evidence, but the sample on which norms were based was rather select: ages 16-21 years and generally composed of college students of the area who came voluntarily for testing and counseling.

A great deal of current research was under way in 1952 which can only be briefly indicated here. A test battery for Home Guard selection purposes was developed; it consisted of a verbal intelligence test in English, a psychomotor test of speed, digit-symbol test, TAT (local adaptation), and a group discussion situation. Some 1,700 candidates were tested from four districts of the province of Bihar. All summary test data were given to the Home Guard Board for the final selection of candidates. Another research project under way was a study of the 25 best and 25 poorest engineering students who were to be contrasted by means of a check list of the necessary traits for success, and, in addition, by a test battery including the Bennett Mechanical Comprehension, a test of spatial relations (similar to that of

the National Institute of Industrial Psychology in England), a verbal intelligence test, and an achievement test. Another graduate student was working on a study of personality factors, using 8 TAT cards, with successes and failures in Grades VIII-X as judged by previous examination results. Still another student was engaged in a study comparing study habits of rural and urban school boys. Research was also under way with Rorschach (Indian norms for ages 10-16) and H-T-P tests as well as with a locally devised word association test. Continued research in connection with the Unesco Social Tensions Project was also under way. There were also some completed studies based on Sherif's work in perception and group norms (29).

LUCKNOW

Department of Philosophy and Psychology, Lucknow University. Professor Kali Prasad is the chairman of this department and, under his direction, the major emphasis has been on social and clinical psychology. There have, however, been studies in the field of industrial psychology and psychometrics.

The work of social psychology has been summarized in Murphy's recent book (22) and will not be repeated here; the department has continued with further studies in this area as well. Work along clinical lines has been directed toward psychodiagnostics and has been especially concerned with projective techniques (Rorschach, Picture-Frustration, Sentence Completion, a local version of the TAT). These have been used in connection with Unesco and Government of India studies on group tensions and social distance. Much of this earlier work has received a new impetus from the establishment of a psychological clinic dealing mostly

with late adolescent and adult cases (Dr. Delton Beier of the Department of Psychology of Indiana University was Visiting Fulbright Professor during the 1952-53 academic year).

The major research in the field of industrial psychology has been a project concerning fatigue and efficiency in textile mills (26). The style and tenor of these reports is highly reminiscent of the earlier work of the (British) Industrial Fatigue Research Board. The Lucknow studies in this area have recently been extended to include research in accident causation.

Psychological testing, from the point of view of aptitude measures, has not been neglected. Such work, however, has not received major emphasis at Lucknow. Projects known to the present writer include an administration of Jalota's group mental ability test (see section on Banaras) and a master's project involving an original test to measure mathematical aptitude at the secondary school level. A Ph.D. student is working on an original group intelligence test in Hindi; another M.A. candidate was at work on applying the Porteus mazes to boys and girls of ages 5-15. Dr. H. S. Asthana (Chicago trained) has prepared a modification of the Thurstone Adjustment Inventory and has worked on Indian normative data for the group Rorschach.

Of interest to American readers will be the large-scale adaptation of the Cornell Value Study to large samples of Indian university students, data for which were planned by two visiting American social scientists in early 1953. Considerable and important comparative data about attitudes, opinions, family structure, occupational values, and the like will be available. Whereas the Cornell project involved only college males, the Indian questionnaire

(made as nearly comparable as possible) will sample several thousand male and female university students.

Of all the psychological libraries that I inspected in India, Calcutta excepted, the one at Lucknow seemed to be the best. It contained an excellent collection of American psychological journals, twenty-five titles at least, most of which went back to volume one.

DELHI

Central Institute of Education.

Largely because of its emphasis on teacher training (the general equivalent of the M. Ed. and Ed.D. degrees are awarded here), the Central Institute of Education has been concerned with aptitude and achievement tests for use in secondary schools. Projects by students have necessarily represented small-scale studies; only certain of these are abstracted in the Institute's publication, *Short Reports of Studies in Education and Psychology*. Certain faculty members have, however, been responsible for some of the more coordinated work in this area.

A Psychological Research Wing is also part of the Institute; a child guidance center has been created there with the help of Dr. James Caughley from New Zealand, who was brought to India by Unesco. During the 1952-53 academic year, the work of this center was extended to one of the Delhi hospitals and to a women's colony where refugee children were housed (and here also was started a class for retarded children).

Under the direction of Uday Shankar, the chief psychologist, a large research project involving the standardization of intelligence tests in Hindi is under way. Two research fellows and four testers comprise the additional staff. An individual scale of intelligence for ages 3-15, modelled on the Terman revision, is to be

standardized. The test will consist of 128 items, divided into two forms, selected from a variety of sources and adapted to Indian conditions. It is proposed that 1,400 children, chosen randomly from 24 Delhi State schools, will be tested. Plans were that the entire testing of this sample would be completed by May of 1954, after which time validity studies were expected to get under way. A second project here is the standardization of a group test of intelligence for children between 5-18 years. Some 150 items for try-out have been collected and the actual testing was to commence in August, 1953. Some research has also been done in the area of selection of student teachers (24). The present writer revised and adapted the Minnesota Teacher Aptitude Inventory for use at this institution.

Psychological Research Wing, Defence Science Organization, Ministry of Defence, Government of India. This organization is largely concerned with the selection of Indian Air Force officers, all of whom are secondary school graduates at least; the work is based primarily on British experience during World War II although the staff is by no means unfamiliar with American research in this area. Security regulations prevent discussing many specific details of this program. The program of aptitude testing for each candidate consumes about three entire days. An enormous amount of psychological data is available that, it is hoped, will someday become available for civilian use in India. Of all the testing programs inspected by the writer, this was by all odds the best organized and the most adequately administered. The entire staff consists of about 20 persons who work in various sections: intelligence, aptitude, personality, training, statistics. Dr. Sohan Lal is the chief psychologist.

BANARAS

Department of Psychology and Philosophy, Banaras Hindu University. Under the present direction of Professor S. Jalota work is being carried on concerning group verbal tests of intelligence, both in Hindi and the English language. Dr. Jalota's emphasis on large student norm groups as well as age norms deserves attention. He has been much concerned with the frequent use of small and unrepresentative samples as well as the lack of validity data.

Work on the group mental ability scale was begun in 1951. The present version of this test in Hindi consists of 100 items (vocabulary, similarities, opposites, number series, reasoning, etc.) with a time limit of 20 minutes. It is the result of an item analysis involving a group of 200 students. Items are arranged according to difficulty values ascertained on this sample. Norms are available for educational levels equivalent to American high school and first-year college and for ages 12-17. The Manual of Directions (in Hindi) also provides a table for the conversion of raw scores into MA equivalents. Separate answer sheets are available, a rarity in India despite their economy. In 1952-53, the test was administered to a total of 2,200 additional students all in Hindi-speaking areas with little change in the original norm group data. Intercorrelations of subtests range from .3 to .6; correlations of subtests with total scores, from .7 to .8. A recent personal communication to the writer indicates that the test is not overloaded with items merely testing verbal facility in Hindi: correlations between test scores and class marks in Advanced Hindi are approximately .27 as is also the case with class marks in advanced mathematics (these results obtained on Allahabad student groups).

Similar work is being done on a

group test in English and Malayalam. Both of these versions have been item analyzed but final validity statistics have not been worked out.

MYSORE

Department of Psychology, Mysore University. Under the direction of Dr. B. Kuppaswamy, formerly at the University of Madras, this department has carried on extensive research on psychological tests in connection with its program of vocational and educational guidance. The research has involved certain general ability tests, aptitude and achievement tests, as well as personality and interest inventories. All are in English.

The performance scale of Collins and Drever is used as a general ability measure. Five hundred children have been tested and norms are available for ages 4-8. Reported reliabilities are not very satisfactory; validity, using the criterion of nursery school teachers' records, is .45. Alexander's Performance Scale for secondary school students has been administered to 300 students. Test-retest reliability for the entire battery is .86; validity, against school marks, is low (.23 for the entire battery). However, Cube Construction correlates .4 against this criterion.

In 1953 work was in progress on a verbal test of intelligence of the omnibus type for the high school level as well as a nonverbal intelligence test for student use. Plans were to standardize both of these during the 1953-54 academic year.

Certain manual dexterity tests have been used for appraisals of students in technical and high school curricula as well as with factory workers. Four of these are the familiar laboratory items of tapping, steadiness, precision, dynamometer; reliabilities, not surprisingly, vary widely; validity here has been

checked against teachers' estimates of success in technical institutes for about 120 students, the coefficients varying from 0 to .6 (in the case of the precision test). Six more complex manual dexterity tests involving coordinated movements of both arms are also used. Examples are nut and bolt assembly, Minnesota Manual Dexterity, two-hand coordination. Some of these tests have been used on small groups of laborers; validity, as against supervisors' estimates, varies from .52 to .75 (for an *N* of approximately 50).

Two personality inventories have been developed. One of these is a test of temperament (cyclothyme-schizothyme) consisting of 80 items which has been administered to 650 college students. Split-half reliability is reported as .69; validity, using known groups, varies from .78 upwards for the individual traits. The second measure is a neurotic inventory, an adaptation of the Woodworth inventory, which has been administered to 200 college students and 200 secondary school pupils. Norms are available in terms of a five-point scale (well adjusted to poorly adjusted). Split-half reliability is .84; known normal and neurotic groups are sharply delineated.

At Mysore was possibly the best equipped psychological laboratory which I was privileged to see in India; furthermore, it seemed to be extensively used. (Kuppaswamy's Ph.D. thesis, incidentally, was a study in genetics using rats—the only mention of the use of animal data I encountered in India.) Two members of the staff have produced a good experimental psychology manual which contains instructions for some 50 simple experiments for undergraduate use (17). Topics include experiments relating to attention, imagery, memory, learning, reasoning, reaction time, conditioning, fa-

tigue, etc. The appendix provides examples and formulas for simple statistical measures: mean, median, mode, Q , SD , ρ . In the main the apparatus to be used are kept simple, utilizing as much paper-and-pencil material as possible.

Studies in the area of industrial psychology have not been neglected. An example is the work of Amin (2), who administered psychological tests to a group of 15 powerloom weavers (tests of threading, warp placing, pin placing, etc., developed on the basis of job analysis). Supervisory ratings collected some four months later, in addition to production data, correlated about .55 with the aptitude measures.

MADRAS

St. Christopher's Training College. In 1949 at the request of the Government of Madras, E. W. Menzel acted as consultant and advisor on aptitude tests for use in Madras schools. St. Christopher's Training College was selected as the center for this research. The result of this work is that four of Menzel's tests are now available for distribution free of charge to interested users: two intelligence tests and two achievement test batteries in the Tamil language for arithmetic, history, geography, and Tamil. There is also an English language test. All of these tests are designed for use approximately at the beginning of the high school course.

Under the direction of Dr. Jean Forrester research is being conducted on the selection of students for teacher training. Interviews, various situational tests, group discussions, and the Madras Senior Level Intelligence Test are used along with a medical examination. As of the spring of 1953, results from these had not been treated statistically.

Department of Psychology, University of Madras. Dr. G. D. Boaz,

chairman of this department, may be familiar to some American readers since he was in America during 1949 and visited several university psychological clinics. Aside from the teaching aspects, interest in research is largely in clinical psychology. Boaz has recently submitted to the Ministry of Education an ambitious plan for the establishment of a mental hygiene clinic but the prospects for implementation appeared to be dim. Boaz does operate a private clinic on his own which is primarily for neurotics. To teach the advanced subjects in psychology (as experimental, mental measurements, social) the small staff at the University is increased by using faculty members from other colleges in the area. In early 1953 two research projects were under way. One of these, under the direction of Boaz, was the adaptation of Murray's TAT pictures to the university student population; another was a Ph.D. thesis on the problem of vocational education (a follow-up of graduates of technical schools) in Madras State.

ALLAHABAD

Bureau of Educational Research, Ewing Christian College. Dr. A. Edwin Harper, Jr., who has a Ph.D. from Columbia University, is in charge of this program. Ewing Christian College is one of the many Presbyterian mission schools scattered over India. (Dr. Harper during 1953-54 was a Visiting Associate of the Educational Testing Service, Princeton; upon his return to India in 1954 he plans to spend an additional year or two with Dr. P. C. Mahalanobis, the statistician, in Calcutta.) He brings to his work in India an excellent background both in statistics and psychology. He has therefore turned his research attention, admittedly limited because of

mission school activities, to the development and standardization of certain psychological selection procedures for use in Indian schools.

Research in 1953 was under way with revisions for Indian use of the Iowa Physics, Chemistry, and Mathematics Aptitude Tests. Experimental use of these tests was to have commenced in April, 1953. Two tests are planned: a physics-chemistry aptitude and a mathematics aptitude, both in simple English. The tests are so designed that the material involving reading comprehension can be easily translated into the language of the region where used, if need be (14).

Dr. Harper has also prepared a Diagnostic Test of General Knowledge both in English and Hindi. Two forms are available, one for arts and one for science students. The test provides separate scores for general science, literature and language, social science, religion and sports, study skills, and background for understanding current events. The present version is the fourth revision of the tests. Reliability is above .90 for both forms.

A Hindi translation of the Bennett Mechanical and limited use of the Cattell Culture-Free Test have produced disappointing results.

A bilingual form of the Cornell Medical Index (questions printed in both English and Hindi) is also available. In a valiant attempt to control the use of this inventory, as well as to learn its usefulness "in the field," Dr. Harper has made the stipulation that copies will be made available only on the understanding that the completed forms will be returned for statistical analysis. Separate forms for men and women have been constructed.

Dr. Harper has also made small but laudable attempts to devise simple

psychological experiments for undergraduates using local material. For example, to introduce students to tachistoscopic data, he has used English as against Hindi numerals and had students compare the results (English was clearly superior—and despite the unplanned lower brightness value of the printed cards).

Mention should also be made of Dr. Harper's consultant work at Vellore Christian Medical College (in South India). The college uses a two-stage selection process. First, aptitude and achievement tests are administered in centers all over India, Pakistan, and Ceylon. (The Moss Medical Aptitude Test was formerly used but now the college is developing its own measuring instrument.) On the basis of this preliminary screening, the 75 most promising candidates are brought to Vellore for the second stage. This consists of certain situational-type tests on the OSS model which were instituted by Dr. Frank Lake, formerly of the British Army. Group Rorschach has also been tried and good results obtained with an adaptation of Monroe's Inspection Technique. The selection board also considers the socioeconomic background of the candidates and the province from which they come; in certain cases this information will serve to counteract low aptitude test ratings. Dr. Harper has acted as a consultant since 1951 and has helped conduct research to evaluate the effectiveness of these new selection procedures as against the old "college marks plus recommendations" approach.

Bureau of Psychology. The Bureau is a government-sponsored agency established in 1947. It specializes in psychological testing, largely for school groups, and applications of clinical psychology. Dr. C. M. Bhatia is the director and his major

research project has resulted in the Bhatia Performance Battery. Both individual and group guidance is available (7). Clinical tests in use are the Rorschach, "applied under local conditions" (32), an Indian version of the TAT, and a free association test in Hindi.

Five individual tests comprise the Bhatia battery: Kohs Blocks, Passalong, Picture Construction, Pattern Drawing, Immediate Memory. A factor analysis of these five tests shows two clear clusters: *g* plus a spatial factor and, secondly, a memory-verbal factor. The five tests are weighted to produce a performance quotient. Criteria employed were school records (for literates) and village opinion (for illiterates). Odd-even reliability is cited as .85 for the former and .84 for the latter. PQ validity was reported as .70 for 642 literates and .72 for 512 illiterates (6).

The Bureau has also developed and published several group verbal and nonverbal tests of general mental ability in Hindi. One of these is the Sohan Lal^a Allahabad Intelligence Test. This is a spiral omnibus type test suitable for ages 11 and up, norms being available for age groups only. Split-half reliability is .94 for a group of about 1,400 individuals; validity had not been ascertained. Rugb (28), using this test with students 10-19 years of age, reports a correlation of .44 with mid-year grades. The distribution of scores he obtained was bimodal and, furthermore and probably more important, there was too much emphasis on the ability to follow written instructions. It was as if the instructions required a higher mental level than the items themselves.

^a Dr. Sohan Lal was formerly the director of the Bureau at Allahabad. He is now chief psychologist of the Psychological Research Wing, Ministry of Defence, Government of India.

The Bureau has also done extensive testing of candidates for the Police Training School, making the results available to the selection boards of such institutions.

From all appearances, the Bureau received very favorable treatment, especially financially, from the government of the State of Uttar Pradesh. Recently five branch centers have been established throughout the state, all under the direction of the Allahabad bureau whose staff numbered ten people. S. N. Mehrotra (Edinburgh trained), the statistician on the staff, has published a good deal in regard to test norms and standardization details, all of these articles appearing in *Shiksha*. From the clinical or psychotherapeutic point of view, the staff members appeared to be poorly trained; I was informed of one young man, with only an M.A. degree in philosophy, who was "practicing" psychoanalysis.

SUMMARY

Research and developments in the area of psychological testing in India as of 1952-53 have been summarized. The orientation in psychology is still largely British but there is currently a noticeable shift to the United States. There is a great deal of interest in aptitude and achievement tests for school use, in applied or industrial problems, in the clinical area, and in tensions research. Most departments of psychology are still very closely tied to philosophy; undergraduate course offerings in social science are sparse. Inadequate communication among research workers greatly hampers research progress, with the result that there is much overlapping of effort. There is the ever-present tendency to look for "quick solutions" and, on occasion, to adapt foreign psychological techniques too uncritically. Much solid

groundwork has been done in the field of intelligence testing but with emphasis on the concept of the IQ. Little basic research in theoretical

areas in psychology has as yet been attempted. Descriptive notes have been supplied concerning all the major psychological locales in India.

REFERENCES

1. ALEXANDER, W. P. *Intelligence, concrete and abstract*. London: Cambridge Univer. Press, 1935.
2. AMIN, D. L. Experiment in selection of weavers on the basis of manual dexterity and further standardization of weaver's tests. *Indian J. Psychol.*, 1951, 26, 105-109.
3. ANTHROPOS. Department of Anthropology, Government of India. *Amer. Anthropol.*, 1948, 50, 576-581.
4. BARNETTE, W. L., JR. Vocational counseling in India. *J. voc. educ. Guidance, Bombay*, 1954, 1, 9-12.
5. BARNETTE, W. L., JR. Summary and recommendations of the Vocational Guidance Conference, Delhi, 1953, *J. voc. educ. Guidance, Bombay*, 1954, 1, 39-43.
6. BHATIA, C. M. Mental survey of a village. *Indian J. Psychol.*, 1951, 26, 111-115.
7. BHATIA, C. M. Educational and vocational guidance for students at the Bureau of Psychology, Allahabad. *Shiksha*, 1952, 3, 62-72.
8. BHATTACHARYA, C. C. Comparative study of reliability of temperament tests. *Indian J. Psychol.*, 1950, 25, 99-101.
9. BISI, S. C. Study of neurotic questionnaire test. *Indian J. Psychol.*, 1950, 25, 95-97.
10. BOSE, S. K. Improving human relations in industries. *Industr. Relat.* (Indian Institute Personnel Management, Calcutta), 1952, 4, 203-208.
11. BOSE, S. K. Testing for accident-proneness in tram driver trainees. *Indian J. Med. Res.*, October, 1952.
12. COX, J. W. *Mechanical aptitude*. London: Methuen, 1928.
13. DAYAL, I. A note on psychological tests in India. *J. educ. Psychol., Baroda*, 1951, 8, 195-197.
14. HARPER, A. E., JR. *Adaptation of Iowa Aptitude Tests. Teaching* (Oxford Press, Bombay), 1952, 25, 45-46.
15. JALOTA, S. *Text-book of psychology*. Banaras: Banaras Hindu Univer. Press, 1952.
16. KAMAT, V. V. *Measuring the intelligence of Indian children*. London: Oxford Univer. Press, 1951.
17. KHADIR, K. A., & YOGANARASIMHAH, M. *Guide to experiments in psychology*. Bombay: Hind Kitabs, Ltd., 1952.
18. MEHROTRA, S. N. Intelligence tests for selection purposes. *Shiksha*, 1952, 5, 74-81.
19. MENZEL, E. W. *Suggestions for the use of new-type tests in India*. (3rd Ed.) London: Oxford Univer. Press, 1952.
20. MENZEL, E. W. Do's and don't's for intelligence tests in India and Pakistan. *Teaching* (Oxford Press, Bombay), 1952, 25, 48-52.
21. MITRA, S. K. Evaluation of psychotherapy by means of the Rorschach test. *Patna Univer. J.*, 1952, 6, 42-47.
22. MURPHY, G. *In the minds of men: the study of human behavior and social tensions in India*. New York: Basic Books, 1953.
23. NAIDU, P. S. *Research in education at the University of Allahabad*. Allahabad: Nandan Press, 1951.
24. PIRES, E. A. Experiment in selection of student teachers. *Shiksha*, 1952, 5, 22-32.
25. PRAKASH, R. Difficulties in adapting and translating mental tests in other cultures. *Indian J. educ. Res.*, 1952, 3, 299-307.
26. PRASAD, K. *Fatigue and efficiency in textile industry, Reports #1 and #2*. Lucknow Univer.: Laboratory of Experimental Psychology, 1950 and 1952.
27. RICE, C. H. *A Hindustani-Binet performance scale*. Princeton: Princeton Univer. Press and London: Humphrey Milford, 1929.
28. RUGH, D. E. Selection of high school students. *Christian Educ.* (Jaharpur, M. P., India), 1952, 29, 20-25.
29. SINHA, D. Experimental study of a social factor in perception: the influence of an arbitrary group standard. *Patna Univer. J.*, 1952, 6, 7-16.
30. SUPER, D. E. Vocational adjustment: implementing a self-concept. *Occupations*, 1951, 30, 88-92.
31. CALCUTTA UNIVERSITY, DEPARTMENT OF PSYCHOLOGY, APPLIED PSYCHOLOGY SECTION. *Report on the working of the section, 1943-1952*. Calcutta: University College of Science, 1953.
32. Bureau of Psychology, Uttar Pradesh. India: U. P. Government, 1952.

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ESTIMATING THE CHANCE EXPECTANCIES OF DIADIC RELATIONSHIPS WITHIN A GROUP¹

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The present paper discusses a mathematical model for computing the chance expectancy of diadic relationships defined by relational analysis procedures (2, 10). In these techniques subjects are asked to select those group members they like most and least as well as to "guess" those who will like them most and least. The subjects may also be asked, in an extension of the method, to indicate whom they think each of the other members will choose and guess.

In relational analysis one of the basic units is the *diad*, i.e., the form of relationship that exists between a pair of group members in terms of whether they like each other and perceive each other as liking in return. The number of possible varieties of diads is either 10 or 45 depending upon whether one asks group members about their choices and perceptions of choice only, or whether they are asked to indicate their dislikes and perceptions of dislike as well.² A few of the 45 possible combinations of the latter case are shown below.

S_i	S_j	
$S_i \rightarrow S_j$		Legend:
$S_i \leftarrow S_j$		\rightarrow chooses
$S_i \rightleftharpoons S_j$		\leftarrow rejects
$S_i \rightleftarrows S_j$		\rightleftharpoons feels chosen
$S_i \rightleftarrows S_j$		\rightleftarrows feels rejected
$S_i \rightleftarrows S_j$		a blank indicates
		omission or per-
		ception of omis-
		sion

¹ This work was done in the Laboratory of Social Relations, Harvard University, under ONR Contract No. N5ori-07646.

Interpretation of the observed frequency of the various diad forms requires that we know what the incidence of these diads would be if chance *alone* were operating, i.e., if group members were robots. We may then regard divergencies from these base-line frequencies as the result of *nonchance* or systematic psychological factors. *The purpose of the present paper is to describe a model that provides an estimate of the chance frequencies and variances of each of the various diad forms.*

NATURE OF THE MODEL

Several chance models are conceivable. The one we choose corresponds to the case where the members are regarded as automata allocating their selections at random. The assumptions inherent in the model are these. First, independence is assumed between the different choices made by any single individual, and between his choices and his guesses. Second, the choices and guesses of any subject are taken to be independent from those of any other subject. Finally, there is the restriction that a subject may not choose or guess the same other person more than once.

The most general form of the model was developed by Luce and Macy and is applicable to the case in which the group members are permitted to

² If the focus of attention is on the members rather than the diads, the number of different diads can be considered to be 81 or 16, instead of 45 or 10. For, when the analysis is concerned with the subjects themselves, it makes a difference whether S_i is related to S_j by a choice ($S_i \rightarrow S_j$) or by a choice-received ($S_i \leftarrow S_j$). From an impersonal point of view, on the other hand, the two diads are identical.

TABLE 1
TWO REPRESENTATIONS OF THE DIADS OBTAINED WHEN CHOICE ONLY IS USED

S_i		S_j		S_i	S_j
C_i	G_i	C_j	G_j		
0	0	0	0	S_i	S_j^*
+	0	0	0	$S_i \rightarrow$	S_j
0	0	+	0	S_i	$\leftarrow S_j$
0	+	0	0	$S_i \leftarrow$	S_j
0	0	0	+	S_i	$\rightarrow S_j$
0	+	0	+	$S_i \leftarrow \rightarrow S_j^*$	
+	0	+	0	$S_i \rightarrow \leftarrow S_j^*$	
+	0	0	+	$S_i \rightarrow \rightarrow S_j$	
0	+	+	0	$S_i \leftarrow \leftarrow S_j$	
+	+	0	0	$S_i \rightleftharpoons S_j$	
0	0	+	+	S_i	$\rightleftharpoons S_j$
+	+	+	0	$S_i \rightleftharpoons \leftarrow S_j$	
+	0	+	+	$S_i \rightarrow \rightleftharpoons S_j$	
+	+	0	+	$S_i \rightleftharpoons \rightarrow S_j$	
0	+	+	+	$S_i \leftarrow \rightleftharpoons S_j$	
+	+	+	+	$S_i \rightleftharpoons \rightleftharpoons S_j^*$	

* Symmetrical diads.

make as many choices and rejections, and to state as many guesses of choice and rejection as they wish (7). It can easily be simplified, however, to fit the case in which choices and guesses are fixed to a given and equal value by the investigator.

Let us take the case in which members of the group are asked to choose and guess a fixed number of others. Consider, now, the components of a diad formed by two subjects S_i and S_j : S_i 's choice of S_j , or (C_i); S_i 's guess of S_j , or (G_i); S_j 's choice of S_i , or (C_j); and S_j 's guess of S_i , or (G_j).

Each of these components may have a value of +, 0, or - indicating choice, omission, rejection, or their perception. There are 81 possible ar-

rangements of +, 0, and - in the four components. Where rejections are not considered, there are only 16 arrangements. Since we shall be discussing the latter in detail, we present them in Table 1.

Notice that there are sixteen different entries but that some are only mirror images of others, thus leaving ten diad forms that are distinguishable, independently of whether they are "read" from S_i or S_j or from S_j to S_i .

Still another feature of the above array merits close attention. If we think of the choices (\rightarrow) and guesses (\leftarrow) as bonds, it can be seen that diads can have 0, 1, 2, 3, or 4 such bonds joining its members. Values above four are not possible. The fact that diads can vary from 0 to 4 bonds is of central importance in what follows.

We may now state the general formula used to generate the chance expectancy of a diad form for the case in which choices and guesses are both fixed to a value d .

$$E = \frac{N(N-1)}{2} [P(C_i)P(G_i)P(C_j)P(G_j)] \quad (1)$$

Where:

N is the number of members in the group.

$P(C_i)$ is the probability of S_i choosing or omitting S_j , these probabilities being $d/N-1$ and $N-1-d/N-1$, respectively.

$P(G_i)$ is the probability of S_i guessing or not guessing S_j , these probabilities being $d/N-1$ and $N-1-d/N-1$, respectively.

$P(C_j)$ is the probability of S_j choosing or omitting S_i , these probabilities being $d/N-1$ and $N-1-d/N-1$, respectively.

$P(G_j)$ is the probability of S_j guessing or not guessing S_i ,

these probabilities being $d/N-1$ and $N-1-d/N-1$, respectively.

The variance for each of the estimates is obtained by the formula:

$$V_E = E \left[1 - \frac{2E}{N(N-1)} \right] \quad (2)$$

As noted before, the number of bonds in a diad may be 0, 1, 2, 3, or 4. Now we shall show that in the case in which choices and guesses are both fixed to a value d there can be only five different values of E , the chance expectancy of the diad, and that these values are a function of the number of bonds in the diad. This is a result of the fact that the four probabilities $P(C_i)$, $P(G_i)$, $P(C_j)$, and $P(G_j)$ (cf. formula 1) can yield only five different products, since each of these probabilities can assume only two different values, $d/N-1$ for a choice or guess and $N-1-d/N-1$ for an omission, as indicated above. Now, if $P(C_i)$, $P(G_i)$, $P(C_j)$, and $P(G_j)$ can each have but two values, x for $d/n-1$ and y for $N-1-d/N-1$, there are only five different products that can be obtained by multiplying them: $(4x)$; $(3x)(y)$; $(2x)(2y)$; $(x)(3y)$; or $(4y)$. If x is the probability of a choice or guess, then the value $4x$ is the probability of a four-bond relationship involving choices and guesses by both S_i and S_j . If y is the probability of an omission, then $4y$ is the probability of a fourfold or mutual omission by S_i and S_j . The value $(2x)(2y)$ is that of a diad with two choices and/or guesses and two omissions, as, for example, where S_i and S_j both choose each other but omit guessing each other or where S_i chooses and guesses S_j but S_j neither chooses nor guesses in return. Thus the five probability products listed above, when multiplied by $N(N-1)/2$, (cf. formula 1), are the probabilities

of 0, 1, 2, 3, and 4 bond diads.

There is one additional feature of the distribution of diads that must be clarified before we can proceed. Certain diads can occur in only one way, e.g., $S_i \rightarrow \leftarrow S_j$; others can come about in two ways, e.g., $S_i \rightarrow S_j$ could also be $S_i \leftarrow S_j$. That is to say, S_i can be a member of the latter kind of diad by either choosing or guessing, and so, too, S_j . In the first type of symmetrical diad ($S_i \rightarrow \leftarrow S_j$) each subject can be a member of such a diad only by choosing (or in the case of $S_i \leftarrow S_j$, only by guessing). Thus, asymmetrical diads have twice the probability of occurrence of symmetrical ones.

COMPUTATIONS AND NOMOGRAPH

Case where data on rejection are not obtained. Let us turn now to the actual computation of chance expectancy for different diads where choice and its perception are to be studied and where data on rejection are not available. Using formula 1 for computing E , the chance expectancy, and formula 2 for computing its variance, we obtain the values given in Table 2. These are the expected frequencies and variances of any symmetrical diad with a specified number of bonds. When a diad is asymmetrical, however, its chance of occurrence is twice the obtained value since it may be formed in two ways, and, consequently, the values obtained from the appropriate formulas have to be doubled to yield the proper expected frequency and variance. The sum of the expected frequencies of all ten diad types must, of course, add to $N(N-1)/2$, the total number of diads in the group. Thus, for $N=10$, $d=3$, the frequencies are as presented in Table 3.

We showed above how the expected frequency of a certain diad with a given number of bonds is a function

TABLE 2
 FORMULAS AND COMPUTATIONS FOR E AND V_E FOR A GROUP WITH $N=10$, $d=3$
 CHOICE-ONLY CASE

No. of Bonds	Formula	Frequency of Each Diad	Variance
0	$\frac{N(N-1)}{2} \left[\frac{(N-1)-d}{N-1} \right]^4$	8.90	7.13
1	$\frac{N(N-1)}{2} \left[\frac{(N-1)-d}{N-1} \right]^3 \left[\frac{d}{N-1} \right]$	4.44	4.00
2	$\frac{N(N-1)}{2} \left[\frac{(N-1)-d}{N-1} \right]^2 \left[\frac{d}{N-1} \right]^2$	2.22	2.11
3	$\frac{N(N-1)}{2} \left[\frac{(N-1)-d}{N-1} \right] \left[\frac{d}{N-1} \right]^3$	1.11	1.08
4	$\frac{N(N-1)}{2} \left[\frac{d}{N-1} \right]^4$	0.56	0.53

of d and N (where choices and guesses are both fixed to a given value d). Indeed, under such conditions, it is the ratio of d to N that completely determines the chance of obtaining diads with 0, 1, 2, 3, and 4 positive bonds. The matter is made clear when one considers the extreme case where both choices and guesses are fixed at 4 and where group size (N) is five and the total number of diads, $N(N-1)/2$, equals 10. The significant ratio here is $d/N-1$. Where $d=N-1$, the ratio $d/N-1=1.0$. For this extreme case, four-bonded relationships are the only ones that can occur. Thus, the expectancy (E) of four-bond relationships is 100 per cent, and it is 0.0 for all other diad forms. At the other extreme, where N is very large compared to d , the ratio $d/N-1$ approaches 0.

This property of E as a function of $d/N-1$, when number of bonds is specified, permits the construction of a nomograph (Fig. 1) that can be applied to any $d/N-1$ ratio and thus obviate the necessity of using formula 1. The nomograph consists of five curves, corresponding to the five classes of diads with 0, 1, 2, 3,

and 4 bonds. Note that the ordinate in the nomograph is a percentage of all possible diadic relations in the group. For example, if $d/N-1$ is equal to .5, the diads with two bonds

TABLE 3
 THEORETICAL FREQUENCY OF THE VARIOUS DIAD FORMS

Diad Type	Value Obtained from Formula	Theoretical Frequency of Diad (E)
$S_i \quad S_j$		
() ()	8.90	8.90
\longrightarrow	4.44×2	8.88
\longleftarrow	4.44×2	8.88
\longrightarrow	2.22×2	4.44
\longleftarrow		
$\longrightarrow \longleftarrow$	2.22	2.22
$\longrightarrow \longrightarrow$	2.22×2	4.44
$\longleftarrow \longrightarrow$	2.22	2.22
$\longleftarrow \longleftarrow$		
$\longrightarrow \longleftarrow$	1.11×2	2.23
$\longrightarrow \longrightarrow$	1.11×2	2.23
$\longleftarrow \longrightarrow$		
$\longleftarrow \longleftarrow$	0.56	0.56

$$\Sigma = 45.00 = \frac{N(N-1)}{2}$$

will constitute 40 per cent of all the diads in the group. To obtain the chance expectancy of any single diad, one decides first how many bonds the diad has. Then, one reads the percentage value from the curve appropriate to that number of bonds, entering the graph at the $d/N-1$ ratio. Finally, this value is divided by 1, 2, 3, or 6 depending upon the number of bonds and the symmetry or asymmetry of the diad (cf. inset table in Fig. 1). The variance can be computed by formula 2 after converting the percentage just found into a frequency by multiplying it by $N(N-1)/2$.

Case where data on both choice and rejection are obtained. Thus far we have been dealing with choices and guesses only. The case in which rejection as well as choice is used is only slightly more complicated, provided that the number of choices and rejections allowed, as well as that of their perceptions, is fixed at the same value d .

When choices and rejections are both used, there are 45 different diads possible, as noted earlier. As in the preceding case, expected frequencies are a function of N , of d , and of the number of bonds in a diad. Note, however, that here, too, there can only be diads of 0, 1, 2, 3, or 4 bonds. Consequently, even with rejections added, we find that the 45 possible diad arrangements can yield but five values for expected frequencies of diads of different numbers of bonds. A choice and rejection are mathematically identical when the number of choices (d_c) and rejections (d_r) have been fixed at the same value. The probability that S_i will choose or reject S_j must be $d/N-1$ as before. However, the probability of an omission is now decreased in view of the addition of the rejection category, becoming $N-1-2d/N-1$.

If this value is substituted for the value $N-1-d/N-1$ wherever it appears in the computation formulas of Table 2, the theoretical frequencies for the choice-rejection case can be easily obtained.

The nomograph presented in Fig. 1 for the case where only choices are used is equally applicable to the choice-rejection case. Note, however, that one must use $2d/N-1$ (rather than $d/N-1$) on the abscissa for choice-rejection situations.³ This doubling of the ratio is necessary here since members are allotting *twice* the number of selections as in the choice-only case.

COMPARISON OF OBTAINED AND THEORETICAL VALUES

It is of interest to see how actual data compare with theoretical sets. In the example given in Table 4 we see that empirical data collected on two well-acquainted groups of Navy men ($d=3$ for each group) differ from chance for the 16-man group, but not for the group of six men. In the latter case both the observed and the chance frequency of 3- and 4-bond diads are relatively high. Thus, it becomes impossible to separate the influence of chance from the psychological factors at work. If, on the other hand, the investigator had used a $d=2$ in the six-man group, considerably smaller chance expectancies for multi-bonded diads would have resulted. The operation of psychological factors could then be more easily distinguished from the influence of chance. It is thus desirable to keep the $d/N-1$ ratio from becoming too large.

It is, of course, the discrepancy

³ It must be remembered that when using both choices and rejections symmetrically includes the positive or negative nature of the selection or guess. Thus $S_i \rightarrow S_j$ is not symmetric while $S_i \rightarrow S_j$ is.

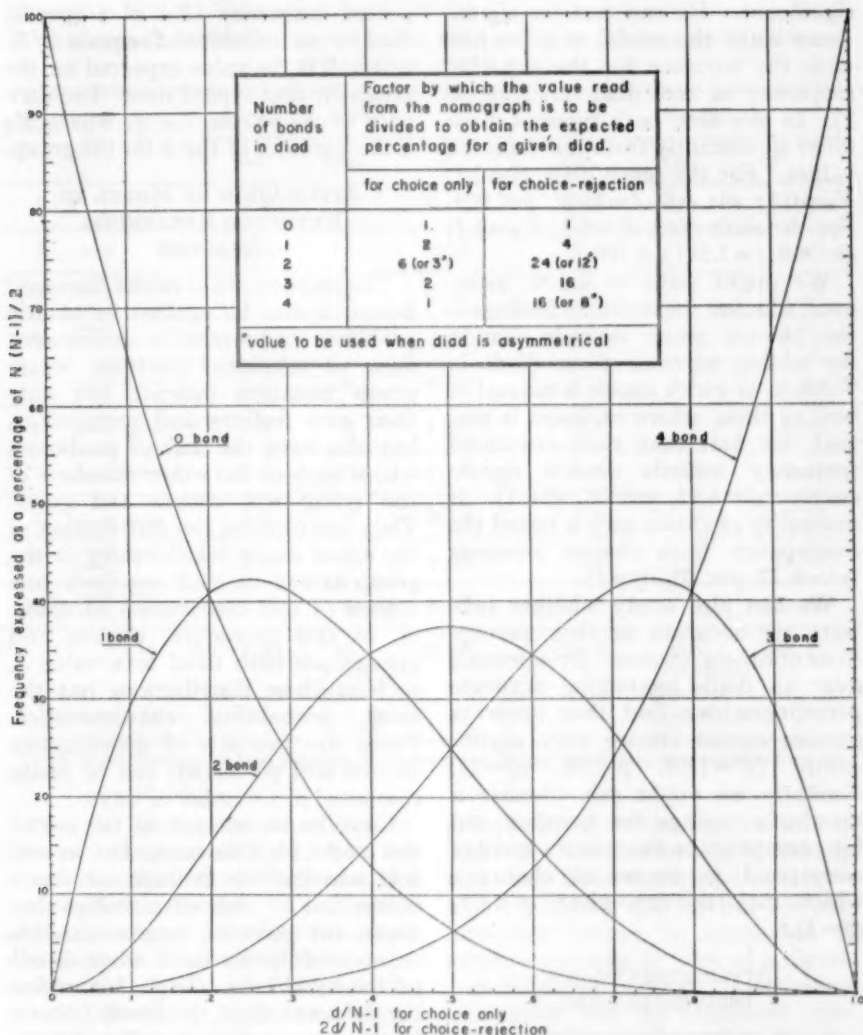


FIG. 1. NOMOGRAPH FOR ESTIMATING THE CHANCE EXPECTANCIES OF DIADIC RELATIONSHIPS WITHIN A GROUP

between expected and obtained frequencies that holds most interest for us psychologically. For example, in the 16-man group the tenth diad in the column greatly exceeds the expected value, while the sixth diad is below expectancy. The former diad in question is one that is marked

by mutuality of choice and perception. The latter is one-sided, one member likes the other and this feeling is perceived but not reciprocated. The investigator might want to know whether the abundance of the former diad and dearth of the latter, relative to expected values, are statistically

significant. He can test for significance since the model supplies him with the variance for the expected frequency of *each* diad (cf. formula 2). In this case, both types of diads differ significantly from the expected values. For the tenth diad, $E = 0.1$; $V_E = 0.1$; $obs. = 8$; $t = 25.0$; $p \ll .001$. For the sixth diad, $E = 6.1$; $V_E = 5.8$; $obs. = 0$; $t = 2.54$; $p < .05$.

We might want to know, moreover, whether mutuality of feelings in the 16-man group exceeds chance. By adding together those diads in Table 4, in which choice is mutual as well as those where omission is mutual, we find that their combined frequency exceeds chance significantly ($\chi^2 = 4.15$, $p < .05$, $df = 1$). If mutuality of choice *only* is tested the discrepancy from chance increases ($\chi^2 = 6.27$, $p < .02$, $df = 1$).

We can also study whether subjects are accurate in their perceptions of others' choices. By summing over all diads containing accurate perceptions, we find that accurate guesses exceed chance very significantly ($\chi^2 = 15.0$, $p < .01$, $df = 1$). Similarly we might ask whether a member's feelings for another and his perception of the other's feelings correspond in excess of chance—which they do ($\chi^2 = 40.45$, $p < .01$, $df = 1$).⁴

APPLICATION TO THE INDIVIDUAL CASE

So far, we have discussed the model as it applies to the expected frequencies of diads for the group as a whole. The investigator may be interested, however, in knowing what the expected frequencies and variances of each diad would be for an *individual member* of the group. Both values can be readily obtained. The ex-

pected frequency (E_i) of a specific diad for an individual S_i equals E/N , where E is the value expected for the group for that type of diad. The variance of E_i equals V_E/N , where V_E is the variance of the E for the group.

APPLICATION OF MODEL TO EXTENDED RELATIONAL ANALYSIS

The mathematical model discussed here can also be applied to certain problems encountered in an extended form of relational analysis, where group members indicate not only their own feelings and perceptions, but also have the task of predicting whom each of the other members of the group will choose and guess. Thus one obtains the distribution of the *actual* diadic relationships in the group as well as each *member's perception* of this distribution of diads. If, in this procedure, choices and guesses are both fixed to a value d , each of these distributions has the same probability characteristics. Thus, the two sets of distributions (actual and perceived) can be easily compared in a number of ways.

Consider an example of the use of the model for this case. Let us ask first whether the average member's conception of the relationships between the pairs of members in his group is different from what is expected by chance. Table 5 contains the relevant data, gathered from a 16-man group of Navy enlisted men. A chi-square test results in a value of 520.75 with a $p < .001$ ($df = 9$). When the last diad ($S_i \rightleftharpoons S_j$) is omitted in view of its extremely low expected value, chi square equals 30.75, still with a probability of less than .001 ($df = 8$). We can then conclude that the two distributions differ and that the perceived relationships are not the result of haphazard guessing on the part of the members.

⁴ For an extended discussion of these and related substantive problems cf. Tagiuri, Blake, and Bruner (11).

TABLE 4
A COMPARISON OF ESTIMATED AND OBSERVED FREQUENCIES OF THE VARIOUS DIAD FORMS
(When $N=6$ AND 16 , $d=3$)

Diad Form	S_i	S_j	$N=6$			$N=16$		
			Est.	Obs.	χ^2	Est.	Obs.	χ^2
1. () ()			0.4	2	6.40	49.1	74	12.63
2. \rightarrow			1.2	1	0.03	24.6	12	6.45
3. \leftarrow			1.2	1	0.03	24.6	8	11.20
4. \Rightarrow			1.7	2	0.05	6.1	9	1.38
5. $\rightarrow \leftarrow$			0.8	0	0.80	3.1	1	1.42
6. $\rightarrow \rightarrow$			1.7	0	1.70	6.1	0	6.10
7. $\leftarrow \leftarrow$			0.8	0	0.80	3.1	1	1.42
8. $\Rightarrow \leftarrow$			2.6	4	0.75	1.6	1	0.23
9. $\Rightarrow \rightarrow$			2.6	3	0.06	1.6	6	12.10
10. $\Rightarrow \leftarrow$			2.0	2	0.00	0.1	8	624.10
Σ			15.0	15	10.62	120.0	120	677.11
				$\chi^2=10.62$			$\chi^2=677.11^*$	
				$df=9$			$df=9$	
				$p<.40$			$p<.001$	

* With the last diad form removed (because of its extremely low expected value) chi square equals 52.77, $p<.001$, $df=8$.

Now let us inquire about the degree of correspondence between the *actual* distribution of diads and the *perceived* distribution. Comparison of the actual and perceived (average) distributions (Table 5) yields a negligible chi square of 7.12, with a $p>.50$ ($df=8$). It is thus possible to say that the distribution of diads perceived by the members does not differ from the actual one but that it does differ from the chance base-line distribution. We may take this to be indicative of accuracy in the perception of group diads.

Though the group consensus corresponds to the actual distribution of diads, the question may be raised about the accuracy of some particular *individual*. Consider S_i whose data

are presented in the last column of Table 5. His distribution differs significantly from the actual one ($\chi^2=33.39$, $p<.001$, $df=8$), but his performance cannot be attributed to random guessing in view of a significant difference between his individual conception and the estimated (random) distribution ($\chi^2=169.75$, $p<.001$, $df=9$). The latter chi square becomes 17.65 with $p<.05$ ($df=8$) even when the last diad form is not included because of its extremely low expected value. His error, therefore, is systematic rather than random. More frequently than not, error by individuals is found to be of this systematic kind, rather than being attributable to haphazard guessing. In S_i 's case, for example, the data in-

TABLE 5

FOUR DISTRIBUTIONS OF DIADS: ESTIMATED (E), ACTUAL, PERCEIVED BY THE AVERAGE MEMBER, AND PERCEIVED BY A PARTICULAR MEMBER S_i

S_i	S_j	Esti- mated	Actual	Average Per- ceived	S_i Per- ceived
()	()	49.1	74	70.4	64
→		24.6	12	11.8	14
←		24.6	8	11.2	15
→	→	6.1	9	8.7	7
→	←	3.1	1	1.8	2
→	↗	6.1	0*	1.7	5
←	↗	3.1	1	1.6	4
→	↖	1.6	1	2.7	4
→	↘	1.6	6	3.0	1
→	↙	0.1	8	7.1	4
		120.0	120	120.0	120

* When the actual distribution served as the "expected" in the chi-square analysis, this particular diad was omitted, yielding 8 degrees of freedom in all.

dicates that he differs from the rest of the members in underestimating the frequency with which fully reciprocated relationships ($S_i \rightleftarrows S_j$) exist in the group.

RELEVANCE TO TRADITIONAL SOCIOMETRY

Is there any tie between the model discussed here and those developed in traditional sociometric work? Several writers have proposed methods for obtaining the chance expectancy of choices or rejections received by individual members of a group by the use of Monte-Carlo methods (8) and the binomial expansion (1). The problem of how many isolates could be expected in a given group has also been dealt with in the same manner (1, 4, 5, 8). Investigators who have

studied "cleavage" have concerned themselves with the expected volume of choices exchanged between subgroups (1, 3, 4, 6, 9), utilizing chance expectancies based upon empirical proportions of one subgroup to another.

The present model is tailored to a form of analysis that has the diad as its basis, and therefore does not have direct bearing on the above work. The diadic approach need not, however, be limited to relational analysis and can be profitably applied to any set of standard sociometric data. Such data yield three or six different diads depending upon whether choice only or choice and rejection is used. The chance frequencies of these six sociometric diads are readily obtained by applying formula 1, after removing the probability factors for the guesses. Previous investigators have concentrated primarily upon the estimate of chance frequency of one type of diad, the *mutual choice*. Proctor and Loomis (9), for example, show that the chance frequency of *mutual* diads with fixed d is given by $[N(N-1)/2] (d/N-1)^2$. A comparison of the above expression with formula 1 will indicate that they are of basically the same form, except for the probability factors involving guesses. This type of model represents the sociometric work most closely related to the type of diad analysis and model discussed here.

SUMMARY

This paper discusses the use of a mathematical model for computing the chance frequency and variance of the diadic relationships obtained with relational analysis. This procedure defines the diads within a group in terms of the pattern of choices, rejections, and perceptions of choice and rejection between pairs of members. The number of possible combinations is 45 when using

choices, rejections, and the perceptions of these, and 10 when using only choice and perception of choice.

Evaluation and interpretation of observed diadic frequencies require knowledge of what the chance expectancy would be if the members of the group operated as robots. The mathematical model discussed here provides this necessary base line in a rational form rather than by recourse to empirical or Monte-Carlo methods.

Formulas for computing the expected frequency and variance of any diad type are given for the case in which choices, rejections, and their perceptions are all fixed by the experimenter at the same value, d . In this case, the expected frequency of any diad with a given number of bonds

is a function of the ratio $d/N-1$. This property of the expected frequency of a diad permits the construction of a nomograph by which expected frequencies can be quickly calculated without resorting to formulas.

The model can be applied to the problem of whether an individual member is embedded in a diadic web that differs from what would be expected by chance. The model can also be used in connection with an extended form of relational analysis adapted to the study of perception of the diadic network in a group.

Examples are given of the application of this model to various problems requiring the comparison of observed data against a theoretical base line.

REFERENCES

1. BRONFENBRENNER, U. The measurement of sociometric status, structure and development. *Sociometry Monogr.*, 1945, No. 6.
2. BRUNER, J. S., & TAGIURI, R. Annual Technical Report No. 2, ONR Contract N5ori-07646. Laboratory of Social Relations, Harvard Univer., March 1, 1953, mimeographed.
3. CRISWELL, JOAN H. Sociometric methods of measuring group preferences. *Sociometry*, 1943, 6, 398-408.
4. EDWARDS, DAISY S. The constant frame of reference problem in sociometry. *Sociometry*, 1948, 11, 372-379.
5. KATZ, L. The distribution of the number of isolates in a group. Series 36, Institute of Statistics, Univer. of North Carolina, 1950, mimeographed.
6. LOOMIS, C. P., & PEPINSKY, H. B. Sociometry, 1937-1947: theory and methods. *Sociometry*, 1948, 11, 262-286.
7. LUCE, R. D., MACY, J., & TAGIURI, R. A. A statistical model for relational analysis. *Psychometrika*, in press.
8. MORENO, J. L., & JENNINGS, HELEN H. Sociometric measurement of social configurations. *Sociometry*, 1938, 1, 342-374.
9. PROCTOR, C. H., & LOOMIS, C. P. Analysis of sociometric data. In Marie Jahoda, M. Deutsch, & S. W. Cook (Eds.), *Research methods in social relations: with special reference to prejudice*. Vol. 2. *Selected techniques*. New York: Dryden, 1951. Pp. 561-585.
10. TAGIURI, R. Relational analysis: an extension of sociometric method with emphasis upon social perception. *Sociometry*, 1952, 15, 91-104.
11. TAGIURI, R., BLAKE, R. R., & BRUNER, J. S. Some determinants of the perception of positive and negative feelings in others. *J. abnorm. soc. Psychol.*, 1953, 48, 585-592.

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THE ADAPTATION AND USE OF KENDALL'S COEFFICIENT OF CONCORDANCE (W) TO SOCIOMETRIC-TYPE RANKINGS¹

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Suppose the members of a group are asked to rank all the members including themselves according to some criterion such as social influence or cooperativeness. It may be desirable to know how much agreement is present in the rankings. Rho's could be computed for the $n(n-1)/2$ pairs of rankings and an average rho would represent the extent of agreement. This becomes time consuming when the N of the group gets large.

Kendall's W (2, 3) is an ideal measure for this situation and it is relatively rapid to compute. To obtain W , the ranks received by each individual are summed and the squared deviations of these sums from the mean computed. This quantity is then divided by the sum of the squared deviations which would result from perfect agreement among the rankers.

W requires that all members be ranked. But in sociometric situations this would mean that the rank a member assigns to himself would have to be included or that he be assigned some rank. If either of these procedures were followed, the index of agreement would be difficult to interpret. It would, therefore, be desirable if a W could be computed which would omit the ranker's self-rank.

The purpose of this paper is to pre-

sent a formula for computing W when self-ranks are omitted. In the usual case W is defined as $12S/m^2(n^2-n)$ where S is the obtained $\Sigma(X-M)^2$, m is the number of rankers, and n is the number of objects ranked. We shall deal with the symmetrical case in which the number of rankers is equal to the number of individuals ranked. Our task is to find the quantity by which S is to be divided when self-ranks are omitted.

Let us first look at a model of a matrix of perfect concordance under this condition where the individuals are arranged in order of received rank.

Rankers	Rankees			
	A	B	C	D
A	—	1	2	3
B	1	—	2	3
C	1	2	—	3
D	1	2	3	—
Sum of ranks	3	5	7	9

It will be noticed that each individual's sum of ranks is different from his neighbors' by a constant amount. This difference will always be equal to $n-2$, because $n-2$ individuals will assign a given individual one rank larger than they ranked his predecessor, while the remaining two

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persons' ranks cancel one another, so to speak. These individuals are the rankee and his immediate superior. The superior assigns the rankee the same rank as the rankee gave him. It will also be observed that the first ranking individual's sum of ranks is always equal to $n-1$. These regularities enable a substitute formula to be achieved.

To obtain the $\Sigma(X-M)^2$ we shall use the formula

$$\Sigma X^2 - \frac{(\Sigma X)^2}{N}$$

with the following definitions: n = the number of individuals in the group, $m = n-1$, and $k = n-2$.

Rank	X	X^2
1	m	m^2
2	$m+k$	$m^2+2mk+k^2$
3	$m+2k$	$m^2+4mk+4k^2$
.	.	.
.	.	.
.	.	.
n	$m+mk$	$m^2+2mmk+m^2k^2$

$\Sigma X = nm + k \Sigma$ 1st m integers,
 $\Sigma X^2 = nm^2 + 2mk \Sigma$ 1st m integers
 $+ k^2 \Sigma$ 1st m squares.

It can be shown that $\Sigma X = mn^2/2$ and that $\Sigma X^2 = (1/6)(2nm^4 + 3nm^3 + nm)$.

It can also be shown that

$$\Sigma(X-M)^2 = \frac{nm}{12} (m^3 - 3m + 2)$$

which is the substitute divisor for S .

The new W is therefore

$$= \frac{12S}{nm(m^3 - 3m + 2)}$$

or

$$\frac{12S}{n(n^2-1)(n-2)^2}$$

To test the hypothesis of independence among rankings the writer has prepared Table 1 showing the W 's necessary to attain significance at the 5 per cent and 1 per cent levels for n = four through fifteen. The formulas used were taken from an article by Durbin (1) who has worked out a general solution to the incomplete block method in ranking experiments of which the present solution is a special case. Of the two methods he presents for approximating the distribution of W , the Beta distribution was used in preparing the table.

TABLE 1

CRITICAL VALUES OF W FOR THE 5% AND THE 1% LEVELS OF SIGNIFICANCE

n	5%	1%
4	.86	.95
5	.59	.73
6	.44	.55
7	.35	.44
8	.28	.36
9	.24	.30
10	.21	.26
11	.18	.22
12	.16	.20
13	.14	.18
14	.13	.16
15	.13	.15

REFERENCES

1. DURBIN, J. Incomplete blocks in ranking experiments. *Brit. J. Psychol.*, (Stat. Section), 1951, 4, 85-90.
2. KENDALL, M. G. *The advanced theory of statistics*. Vol. 1. London: Griffin, 1947.
3. KENDALL, M. G. *Rank correlation methods*. London: Griffin, 1948.

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COMPLEX TASKS FOR USE IN HUMAN PROBLEM-SOLVING RESEARCH¹

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Progress in any field of research depends on many things in addition to the ideas produced by the individual research men, among them the availability of measuring instruments and of standard materials and techniques. The current high level of activity in research in learning theory, for example, would be impossible without the existence of nonsense syllables, mazes, conditioning techniques, and so on. The purpose of the present paper is to consider the extent of the use of such materials in the field of human problem solving, or, more specifically, in that part of the field which works with complex apparatus problems, by examination of a number of such problems which have been used in past research.

Development in the direction of standardized materials is already taking place in some sorts of human problem-solving and reasoning investigations: in work on concept formation, the Weigl and Vigotsky materials and the more recent Wisconsin Card Sorting Test and Hovland's flowers; water jar problems, anagrams, etc. in research on set; short, statistically evaluated problems of many kinds in factor analysis studies. In order to keep the present endeavor within reasonable limits, of the many remaining sorts of prob-

lems, only the more complex have been considered. Complexity refers here to the amount of work the subject must do in solving the problem: (a) several responses are usually required, (b) more than one hypothesis is available, (c) trial and error includes more than one or two trials, and (d) more time than that needed for a single brief act is required. Although complexity was the principal criterion, others were also used: (a) publication of a clear description of the problem, (b) the presence of a solution which could be classified as successful, and (c) in most cases, the presence of some sort of physical equipment in the task. Certain kinds of complex problems have been omitted on what may be a purely arbitrary basis, as when mathematical problems were ignored because their great number discouraged any attempt at selecting a few as samples. The same thing is true of card tricks and parlor puzzles of the bent nail variety. An additional criterion operated in the selection of problems in which the experimenter could watch the subject's solving processes at work, as opposed to problems where he sees only the solution, the end product.

Problem solving may be defined as the process of changing a given situation to a specified different situation, the process being new to the solver, and ending when the solution is achieved—which means that the process is not repeated. This definition will include cases in which the problem is solved by "pure" trial

¹ This research was carried out under the Air Force Personnel and Training Research Center, Lackland AFB, San Antonio, Texas, in support of Project 7709. Permission is granted for reproduction, translation, publication, use, and disposal in whole or in part by or for the United States Government.

and error, as in McGeoch's Problem Box (task 28). If one wished to exclude that condition he could add: the situation being such that there is some basis for selecting one alternative as more probable than the others.

Following Duncker (10, p. 1), problem-solving tasks may be thought of as divided into three parts: (a) the given situation, (b) the desired situation, and (c) the method of proceeding from the one to the other. The individual problem-solving experiments discussed here seem to use either of two procedures; they ask the experimental organism to discover the operations which will change the first into the final situation, or they give him the first situation and the operations and ask him to predict the final situation. The above definition is intended to include both of these procedures. Most of the tasks described use the first of them. Székely's Candle Lever (task 1, below) and his Hydrostatic Levers (tasks 3 to 5) are examples of the second. Discovering the operations sometimes includes a fair amount of intellectual work; so one may classify here the form of the Candle Lever in which the subject is shown the first situation, the operations, and the final situation, and is asked to explain why the operations produced the result, i.e., is asked to provide the rational basis for the operations.² A different kind of example

is provided by one group which worked on Maier's Hat Rack (task 10). The experimenter required this group to watch him build the hat rack and then asked them what possible function the structure could serve (21, pp. 352-353). Referring back to the definition of problem solving given above, "changing . . . to a specified different situation," it is the "specified" part which the hat rack subjects were asked to supply; so this example may be classified with the procedure of predicting the final situation.

The tasks considered in the preparation of this paper are listed and briefly described in the next section. They include all those which met the criteria described in a previous paragraph, and which were reported in articles covered in the *Psychological Abstracts* from the middle of 1948 to the middle of 1953, plus those in journals too new to have been abstracted by July 1, 1953. Actually, this search of *Psychological Abstracts* unearthed very few problem-solving tasks which had not been described previously. They and a few added older tasks have been referred to under the earliest references available

ever, on the ground that they were not used as problem-solving tasks as problem solving is defined here.

As used by Deutsche (9) the problems present examples of several of the desirable attributes listed; they provide scoring continua since it was possible to classify the answers on an eight-point scale; and there is some evidence of validity since the split-half "reliability" coefficient of .74 suggests that if the experimenter has correctly identified some of the tasks as examples of some particular psychological process, then the others are probably examples of the same process. On the other hand, with regard to the "special knowledges" criterion, it seems not impossible that the answers the subjects gave to the questions might be better classified as knowledge rather than as reasoning, which does not imply that they are not examples of how children think.

² It is tempting to add further examples of providing an explanation from the demonstrations used by Piaget (27) and Deutsche (9), such as inverting a glass jar over a burning candle and asking why it stopped burning, putting a stone into a beaker of water and asking why the water level rose, or putting a penny into a box which has strings attached to the corners, swinging it in a circle overhead, and then asking why the penny does not fall out. These descriptions are not included, how-

for each. It is thought that the list includes most of the tasks of the desired sort which have been described in the psychological literature in the last twenty years.

DESCRIPTIONS OF THE TASKS

1. *The Candle Lever* (Székely, 32)

Given and required: The central part of the task is an arrangement of a lever with a fulcrum toward one end of it, the lever being balanced by a candle on the short end. In one form of the task, the candle is burned, the lever tips up, and the subject is asked to explain why. In another form, the subject is shown the equipment with the candle not burning and asked what would happen if it were lit. In the third form, the parts of the apparatus are placed on the table with other objects, including a box of matches, and the subject is asked to construct an arrangement in which the lever will tip after a few minutes. In a variant of this third form of the experiment, the objects on the table include a labeled bottle of ether or benzine.

2. *The Inclined Plane* (Székely, 32)

Given: A small cart stands halfway up an inclined plane, a string running from the cart over a pulley at the top of the plane and down to a metal weight. The weight is half submerged in a container of water so it balances the cart. On the table are a pipette and another container partly full of water. In another form of the task, the metal weight is replaced by a block of wood.

Required: Think of a method by which the cart can be moved up the incline 1 or 2 cm. Use the pipette, but do not touch the cart itself.

3. *Hydrostatic Lever, Single Weight* (Székely, 32)

Given: With the subject watch-

ing, a container half full of water is placed on one end of a long narrow board (50×10 cm.) and the board is balanced on a fulcrum. A metal weight is hung just above the water. In a second form of the task, the metal weight is replaced by a wooden one of the same size.

Required: If the weight is lowered until partly submerged, not touching the sides or bottom of the container, what will happen to the lever?

4. *The Hydrostatic Lever, Symmetrical* (Székely, 32)

Given: A lever with a metal weight at one end and a wooden weight at the other large enough to balance the metal when the lever is supported at the center. The wooden weight is higher and wider than the metal, and they are hung with bottom edges level. The weights hang in a large container which contains water up to a level just below the bottom of the weights.

Required: Suppose we put in more water so that both weights are immersed to a depth of 2 cm. What will happen?

5. *The Hydrostatic Lever, Unsymmetrical* (Székely, 32)

Given: A lever with a metal weight at one end and a wooden weight of equal size at the other is balanced on a fulcrum, which would be closer to the metal weight. The weights hang in a large container which is filled with water almost up to the bottom edges of the weights.

Required: Suppose we filled the container with water. The rising water level would simultaneously touch the bottom of both objects. Now we let more water run in, until both objects are immersed by about 2 cm. What will happen? (32, p. 16).

6. *The Hollow and Solid Spheres* (Székely, 33)

Given: After teaching the subject something of moments of inertia and of rotation, the experimenter says to the subject, "Imagine that we have two metallic spheres of exactly equal size and exactly equal weight before us. The spheres are covered with a lacquer which makes it impossible to distinguish the spheres from one another. However, there exists a concealed difference between the two spheres. One consists of a very light, the other of a very heavy metal. How is this possible?" (33, pp. 392-393). If the subject is not able to tell that one must be hollow, the experimenter tells him so. The experimenter then draws cross sections of the spheres, with the hollow space relatively small.

Required: How could we determine which of the two spheres is the hollow and which the solid one? There are no physical or chemical tools at your disposal. The spheres are not to be damaged, no holes drilled, no pieces cut out, and no paint removed. Try to think of a method so simple that we can decide this question in this room without any apparatus.

7. *The Pendulum Problem* (Maier, 17)

Given: The subject is presented with four poles varying in length, one table clamp (C clamp), two burette clamps, two pieces of wire, several pieces of chalk, and several weights (pieces of lead tubing at Berlin, bolts at Michigan), and there are two chalk marks on the floor.

One pole must be at least as long as the distance between the chalk marks. Two of the remaining poles must together equal the distance from floor to ceiling, plus enough overlap for the C clamp to hold them.

Maier says, "All the experience necessary for the solution was given to the subject and did not have to be recalled by him" (17, p. 116).

Required: Make two pendulums, each holding a piece of chalk, which will swing over the chalk marks already on the floor, and will mark the floor.

This task was also used by Weaver and Madden (37).

8. *Blowing Out the Candles* (Maier, 17, 19)

Given: Among many objects lying on a table there are pieces of glass and rubber tubing, 6 to 12 in. in length, poles several feet in length, paper clamps; lighted candles are on a table some feet distant.

Hint 1. Water is siphoned from one container to another with a tube constructed like the one involved here. This is to give the subject the idea of the construction of the tube.

Hint 2. A piece of cord is hooked over a nail by the use of a pole. This is to bring the pole to the attention of the subject.

Required: Blow out the candles while standing several feet away (8 ft. in the later article, 19).

This task was also used by Saugstad (29).

9. *The Two String Problem* (Maier, 18)

Given: Two strings dangle from the ceiling too far apart to permit anyone to reach both of them at the same time, or to carry one over to where he can reach the other. There are many other objects in the room including a chair, a stick, more string, pliers, etc.

Hint 1. The experimenter brushed against a cord and set it swinging.

Hint 2. The subject was handed the pliers and told to use them.

Required: Tie the two pieces of string together.

This task was also used by Battersby, Teuber, and Bender (2), Birch and Rabinowitz (4), Cofer (7), Cofer and Gelfand (8), and Guetzkow (12).

10. *The Hat Rack* (Maier, 19, 21)

Given: The subject is presented with two poles, neither of which will reach the ceiling, but each more than half the required length, and a C clamp.

Hint 1. The two string problem is presented first, each string hung from an inverted U-shaped construction which utilizes the principle of the hat rack for each support pole. This is built by the experimenter, and left standing during the solving of the hat rack task.

Hint 2. The structure of Hint 1 is built and then removed before the hat rack task is presented.

Hint 3. The subjects who had been in the group in which the two string structure had been removed were asked to draw it.

(These hints were used in the later experiment, 21.)

Required: Build a hat rack sturdy enough to hold a hat and a heavy coat.

This task was also used by Cofer and Gelfand (8).

11. *The Children's Swastika Pathway* (Maier, 20)

Given: The child learns his way around a swastika-shaped path, with a booth at each end, the booths being different in size, shape, and furniture. The child then is shown a toy in one booth, the toy requiring a penny to make it work.

Required: The child is given a penny somewhere outside the apparatus, introduced into a booth other than the one with the toy, and expected to find his way to the toy.

12. *The Box Problem* (Duncker, 10; and Adamson, 1)

Given: On a table, among many other objects, lie a few tacks; three little pasteboard boxes (more or less the size of match boxes), apparently not identical in size, shape, color, position; and three candles. In one experimental situation, the candles are placed in one box, the tacks in another, and matches in the third.

Required: Put the candles side by side on the door of the room at eye height ("for visual experiments").

13. *The Gimlet Problem* (Duncker, 10; and Adamson, 1)

Given: Among other objects on a table lie three cords, two screw hooks, and a gimlet. In one experimental condition, there are three holes in a board on the wall, in the other the holes have not been bored.

Required: Hang the three cords from the board.

14. *The Paper Clip Problem* (Duncker, 10; and Adamson, 1)

Given: Many objects lie on a table, among them a piece of white cardboard, four smaller pieces of black cardboard, paper clips, glue or thumb tacks. A screw eye is fixed in the ceiling. In one condition of the experiment the black pieces are fastened to the white one with paper clips, in the other they are glued on (Adamson had them tacked on).

Required: Hang the cardboard arrangement from the ceiling screw eye.

15. *The Cut Pyramid* (Katona, 13, Duncker, 10; and Reid, 28)

Given: An orthogonal tetrahedron (a four-sided pyramid, the sides being triangles of equal size), cut into two pieces along a plane defined by a line running between the midpoints of the sides of a triangle and parallel to its base, and a similar line parallel

to the same edge of the tetrahedron and in another triangle.

Aid 1. What does this problem, to form a solid having only triangle surfaces, really mean?

Aid 2. Doesn't it mean forming large triangular surfaces, or at least one for a start?

Aid 3. Which two of all these surfaces when seen as extending together in the same plane, i.e., together forming one plane, ought to make that plane a large triangular surface, just the kind we are looking for?

(These aids were used by Reid, 28.)

Required: Put these two pieces together to make a pyramid. (Duncker did not permit actual manipulation of the pieces, but had the subject tell him how to do it.)

16. *Breaking the Beads* (Bulbrook, 5)

Given: The subject is presented with a string of beads arranged to alternate one yellow with two white, but with five white beads in the center. Other objects (pliers, needle, saw, etc.) lie on the table.

Required: Instruction 1. Make a single regularly repeated pattern without either unstringing or re-stringing the beads, and without either knotting or breaking the thread. Proceed aloud.

Instruction 2 was like the above except that, "Use any of the means supplied on the table" was inserted between the two sentences.

Note: The task following the one above in Bulbrook's article was similar to it. The string was made of unpainted wooden beads and ink stained wooden beads and the subject had to stain the extra beads with ink from a bottle on the table.

17. *The Balloon in the Bottle* (Bulbrook, 5)

Given: A deflated toy balloon, a

75-cc. flask, a penstaff, pencils, a file, were presented to the subject. In group experiments the experimenter put the balloon into the flask and blew into the balloon.

Required: To blow up the balloon inside the bottle.

18. *Weighing the Coins* (Simmel, 31)

Given: The subject is to imagine he has eight coins, which may or may not include one counterfeit which would be lighter than the others. He also has an imaginary balance.

Required: In two weighings, identify the lighter coin or prove that there is none.

Simmel also used nine coins, one certainly counterfeit, in two weighings; twenty-five coins, one certainly counterfeit, in three weighings.

19. *The Shooting of the Captain and His Son* (Burack, 6)

Given: The subject is presented with a printed problem referring to two men shot to death at close range, the gun being under one body, no footprints except their own, and so on.

Required: The subject is asked to tell whether each man was killed by accident, suicide, murder, and later is asked more specific questions such as, "Was there information which would tell which man died first?" etc.

20. *The Cylinder in the Can* (Saugstad, 29)

Given: A wooden cylinder is placed upright in a can into which it fits loosely. Apparently the top of the cylinder should be a bit below the top of the can, and the fit should be close enough that one cannot put his fingers in between the can and the cylinder. On the table beside the can are a penholder, pliers, thread, screw driver, pitcher of water, drinking glasses.

Required: Get the cylinder out of the can without tipping the can.

21. *Twenty Questions* (Lindley, 16; Taylor and Faust, 34)

Given: The subject is told that the experimenter is thinking of an object and whether it is in the animal, vegetable, or mineral kingdom. The subject is to ask questions which narrow the field of possibilities, each question being answered by "Yes," "No," "Partly," "Sometimes," or "Not in the usual sense of the word." A question which cannot be so answered must be restated. This description applies to Taylor and Faust's procedure.

Required: The subject is to be able to name the object with thirty questions or less (Taylor and Faust).

22. *The Incorrect Square Root* (Marks, 22)

Given: The subject is taught a method of finding square roots using a calculating machine and a table of factors. By means of incorrect entries in the table, the subject gets wrong answers to two out of four problems.

Required: Ascertain the source of the error.

23. *The Disc Transfer* (J. Peterson and Lanier, 25)

Given: The subject is given three stationary circles (e.g., painted on a board) and several discs varying in diameter, stacked on one circle in order of size, the smallest at the top. (If one were going to make himself a set of discs, it would be easier to make squares.)

Required: The subject is to transfer the stack to another circle, moving one disc at a time, using the third circle as a way station, never putting a disc on a smaller one. He starts

with two discs, then three, and so on to seven.

This task was also used by Shaw (30).

24. *Making the Last Draw* (J. C. Peterson, 26)

Given: The subject is presented with a set of seven beads on a string (or seven matches or pennies or other objects lying on a table). He is told that he and the experimenter will draw from the set alternately, each taking one or two beads as he wishes. The subject gets the first turn and is to try to draw the last bead.

Required: To learn to win the game every time with different numbers of beads; to find a general principle for winning (a) with draws of one or two beads, (b) with draws of other numbers.

This task was also used by Waters (36).

25. *The Electromaze* (Kruglak, 15)

Given: The apparatus presents the subject with four push buttons arranged in a square, with a fifth button in the middle. On top of the box are a red light and a green light. The center one of the five buttons is an "erase" button.

Required: The subject is to solve a series of seven problems, most of which are sequences of button pushes. The red light indicates an error in the sequence and the subject then pushes the "erase" button and starts again on a new trial. The green light appears only at the end of a correct sequence.

26. *Water Jars Problems* (Terman, 35)

Given: Typically, the subject is told to imagine that he has two or three containers of specified sizes,

although sometimes actual containers are used.

Required: To tell the experimenter how to use the containers to secure a given amount of water, no estimations (as of "half") being permitted.

This sort of task has been used by many people, lately especially in investigations of set.

27. *The Multiple-Choice Apparatus* (Yerkes, 39; and Beasley, 3)

Given: In the form of the equipment used for humans, the subject sits before an apparatus from which any one or any set of twelve keys can be protruded toward him. Repeated problems can be presented by different sets of three keys each, or by successive sets of keys which vary in number except that the number is always odd, and so on.

Required: To find the key which will cause a buzzer to sound; to find a rule by which to identify the correct key in future sets.

Note: This task has a correlative form which can be used with animals, and it is ordinarily assumed that the problem is the same for human and animal subjects.

28. *McGeoch's Problem Box* (Erickson, 11)

Given: The subject is given a box, $8 \times 8 \times 12$ in., with three knobs protruding from each of two opposite sides, and a seventh knob on one end. The knobs can be pushed, pulled, turned, or ignored, making a complex trial and error problem.

Required: Remove the end containing the knob.

29. *Moments of Levers* (G. M. Peterson, 24)

Given: A lever is set on a table with hooks at two-inch intervals out from the fulcrum, the hooks being plainly numbered 1, 2, 3, 4 from the center

out, on each side. Ten weights, all of the same diameter and of different lengths, are provided, again plainly numbered 1, 2, 3, 4, 5, 6, 8, 9, 10, 12.

Required: The experimenter says, for example, "If you had a 1 ounce weight on 4 (he puts it there), where would you put a 2 ounce weight to balance it?" The subject gives his answer in writing and the weight is not actually hung on the lever to show that it does or does not balance. The subject receives no knowledge of results, neither by actual trial, nor by any statement from the experimenter. Instead, each problem is followed by a demonstration of a different problem. There are twenty problems and twenty demonstrations. The subject is now asked to state the principle involved.

ATTRIBUTES WHICH MAY BE
USEFUL IN PROBLEM-
SOLVING TASKS

It is possible to offer a set of attributes which may be found useful in problem-solving tasks, although none of the tasks considered in the paper meet the complete list. In fact, it may be doubted that any one task ever will exhibit all of them, and some of them are certainly unsuited to certain kinds of investigations, as for example, "only one way of solving the problem" is certainly not desired in most of the current experiments on set. The attributes are presented as suggestions to be considered in choosing or designing tasks, and in the hope that they will serve as a base from which improved lists of criteria can be constructed.

Two important criteria for problem-solving tasks are that the task should provide a scoring continuum longer and more useful than the two-step continuum of pass-fail scores which have been frequent in problem-solving tasks, and that it should

provide the experimenter with a maximum amount of knowledge of what the subject is doing. Hypotheses must be regarded as intervening variables, definable on the basis of the task presented and of the overt responses produced. The experimenter's knowledge of what the subject is doing is provided by his knowledge of the task and by these overt responses. Other more detailed characteristics of tasks may be listed under those headings, some of them falling under both.

Score Continuum

A continuum of scores from a task will be useful in differentiating among subjects and among experimental groups, thus increasing the possibility of finding functional relationships with independent variables. The scores should all lie along the same dimension—a matter of knowing what the subject is doing, or, in other terms, of factorial purity and of validity (see below).

A continuum may be found in (a) the number of unsuccessful trials preceding solution as in Kruglak's Electromaze (task 25) where the subject has to discover a sequence by trial and error and one can count the number of errors; (b) the number of problems from a series on which the subject was successful, as, again, in the Electromaze where several sequences are to be discovered, or as in Water Jars problems (task 26) where one can use as many problems as he wishes, or in the Children's Swastika Pathway (task 11) where the child is asked to find the goal from different points within the swastika, or in Burack's Shooting of the Captain and His Son (task 19) where there is a series of questions to be answered, or in G. M. Peterson's Moments of Levers (task 29) where 20 problems are given with the

same lever, but with differing weights and distances, or in the Multiple-Choice Apparatus (task 27); (c) the number of steps on which the subject succeeded (see paragraph below); and (d) the amount of assistance provided before solution as was done by Maier with his Pendulum Problem (task 7) and by Reid (28) in an experiment with Katona's Cut Pyramid (task 15). Deutsche (9) turns a qualitative answer into a quantitative one by providing an eight-point scale against which to compare it (see footnote 2). Other possibilities for providing continua are given below under Types of Scores.

Time to solution always provides a possible scoring continuum and has been used frequently, but it is possible that time is not always a desirable measure of problem-solving performance, because, for example, the events which occupy that time may not all lie on the same behavior dimension. Consider also Maier's statement that "some subjects worked as long as three hours, those who got the solutions worked five or ten minutes" (17, p. 121).

Subgoals

One possible method of providing a continuum of scores is to use a problem which includes several steps, several subgoals on the way to the final solution. This is to be differentiated from a series of problems as that phrase was used in the preceding section, in that in a series of problems each is independent of the others, whereas in a series of steps, what the subject discovers on one step is, ideally, used on the next step. A nice example of a problem containing several steps is provided by Making the Last Draw (task 24), where the subject learns to solve a problem with successively larger num-

bers of manipulanda and where he typically makes his generalizations about the method more and more inclusive as he goes along. Another example is given in Simmel's Weighing the Coins (task 18), where the subject has to identify the odd coin from among eight, then from among nine, then from twenty-five. Peterson and Lanier's Disc Transfer (task 23) is another series of steps in which increasing numbers of pieces can be used. Increasingly complex tasks can be presented with Yerkes' Multiple-Choice Apparatus (task 27).

It is probably much too early in the history of research in problem solving to ask for a set of steps such that if a subject fails on one step we can be sure that he will fail all succeeding steps, but this would be an advantageous feature of any complex task, especially if the task were ever to be used in measuring problem-solving abilities or aptitudes. If the steps of the problem cannot be arranged in any such scale as that implied in the previous sentence, then the task must provide every subject with an opportunity to try every step. An example of a task where the latter does not happen is Maier's Pendulum Problem (task 7), where the subject must construct a pendulum which will make marks across particular spots on the floor and where he can hardly begin on the marking step of his problem until he has constructed the pendulum.

Few Hypotheses

It will assist the experimenter in knowing what the subject is doing if the possibilities for action are limited, which is to say that the task should permit only a small number of hypotheses, including both apposite and inapposite hypotheses. The number of possible hypotheses is different from the number of steps in a problem or

the number of problems in a series since the number of hypotheses includes the possible inapposite hypotheses which the subject may propose. Maier's Blowing Out the Candles (task 8) requires two steps in the construction of the tube, the joining of the pieces and the stiffening of the construction, each with its accompanying hypothesis, and an additional step and hypothesis in blowing through the tube. Maier also, however, lists additional inapposite hypotheses such as pouring water down the tube; so the number of hypotheses is greater than the number of steps. The opposite sort of example, of an indeterminate number of hypotheses, is provided by Twenty Questions (task 21) and by Yerkes' Multiple-Choice Apparatus (task 27). Insofar as most of the tasks being considered here are one-apposite-hypothesis kinds of problems, it is easy to list their apposite hypotheses as in Duncker's Box Problem (task 12), where the only hypothesis needed is that the box can be fastened to the wall to make a shelf, or in Bulbrook's Breaking the Beads (task 16), where the idea of smashing the beads is the only idea needed. It is rare, however, that an investigator attempts to list all of both the apposite and inapposite hypotheses, although one man does so when Marks' description of the Incorrect Square Root Problem (task 22) says that the difficulty may lie in the operator, the calculating machine, the method, or in the table of factors. Even here, however, one may wonder whether subjects cannot produce further hypotheses, as, for instance, in producing several about the particular fault which may be occurring in the operator.

One Solution

Having only one solution, and

only one method of arriving at that solution for a problem, or for the steps or parts of the problem when there are any, will contribute further to the experimenter's knowledge of exactly what the subject is doing. These attributes will also contribute to factorial purity and to reliability. Maier's Two String Problem (task 9) may be mentioned here to emphasize the statement made in the introduction to this section of this paper where it was pointed out that not all of these attributes would be desirable in all problems. The Two String Problem has four or five possible solutions³ and that feature of the task is an essential feature of, for example, one of Guetzkow's experiments (12).

Multiple Scoring

More than one method of scoring the subject's behavior may sometimes bring surprises, as when two methods do not agree in their ratings of the subjects' performances. Such disagreements may lead to a finding that different dimensions or aspects of the behavior are being measured, or, of course, to the conclusion that one or all of the scores are unreliable. On the other hand, if the scoring methods do agree one will be justified in thinking them the more reliable. Several methods of scoring are presented below in the section on scoring. We have a fine example of ingenuity in the invention of scoring methods when Burack uses ten (task 19).

Overt Behavior

If the experimenter is to get a maximum amount of information about subject behavior, it will ob-

viously be of advantage that as much as possible of the behavior be overt, with any covert behavior being treated as intervening variables. Such overt responses could be verbal if they are parts of, rather than reports of, the solving. Equipment problems are more likely to produce overt behavior than are other types, and ideally each possible apposite or inapposite hypothesis would be expressed in some manipulation of the equipment, different hypotheses producing different manipulations. There are tasks in which all of the apposite, and perhaps even all of the inapposite, hypotheses are expressed overtly. Bulbrook's Balloon in the Bottle (task 17) is a case in point. The subject must inflate the balloon inside the bottle, and to do so must insert into the neck something to prevent the balloon from completely filling it and thus preventing escape of the air. Inserting a pencil or a glass tube into the bottle neck would seem a fairly good indication that the subject is using the air escape hypothesis. If Simmel (task 18) had provided actual instead of imaginary balances and coins, she might have had an overt expression of an inapposite hypothesis when the subjects tried to solve the problem by dividing the coins equally between the two pans of the balance. Saugstad's Cylinder in the Can (task 20) offers opportunities to watch the subject manipulate a water pitcher as the result of a hypothesis about floating the cylinder high enough to permit grasping it and removing it from the can. Saugstad also provides an opportunity for inapposite hypotheses to exhibit themselves by overt, manipulatory behavior as when an attempt is made to loop a thread around the cylinder, to grasp it with pliers, to insert one's fingers into the can, etc. It may be, however (and the present

³ "Four or five" because although Guetzkow and Maier list four, Duncker (10, p. 23) lists a fifth, which, however, does not seem to me to be a solution.

writer has not seen the equipment), that these hypotheses could be rejected on the basis of visual cues, which produces the same practical results as if they were rejected on a completely covert basis. Kruglak's Electromaze (task 25) seems to offer a fine opportunity to see subjects adopt hypotheses although Kruglak makes no reports of such aspects of their work. These examples suggest that it may be possible to design tasks that will do excellent jobs of turning internal, symbolic behavior, into external, observable behavior.

Unidimensionality

Another characteristic of problem-solving tasks which would increase the experimenter's knowledge of what the subject is doing would be to have him doing only one kind of thing at a time; for example, using only one hypothesis at any one moment, or, in other cases, using only one type of process (as deduction, induction, perceptual reorganization). This is a request for what the factor analysts call factorial purity and what the experimentalists call unidimensionality. It implies more knowledge than is presently available about such intervening variables as hypotheses and processes, and about tasks demanding overt responses which will differentiate one intervening variable from another. On such bases we could choose tasks which included only one dimension, or, when desired, tasks including more than one dimension, but in which the dimensions are known and differentiated by different kinds of responses. Work on this sort of thing is proceeding apace among the factor analysts, but there is very little of it in the more complex apparatus task studies.⁴

⁴ It is possible to find an example of an attempt to identify psychological dimensions in a problem-solving task by going outside

Granting that there is available little knowledge of intervening variables in problem solving, or of the operations which will discriminate among them, it is still possible to rule out patently "extra" abilities such as the arithmetic ability needed in a water jar problem which includes such numbers as 163, 29, 11; although it may be permissible to include them in cases where it is fairly certain that every member of the experimental population has the ability in a high degree, as when Duncker and Adamson expect all their subjects to be able to bore holes with a gimlet (task 13) and to bend paper clips (task 14), or when Marks expects his subjects to have enough arithmetic ability to learn to find square roots (task 22). Examples of the other kind of task, that which is multidimensional, are apparently provided by the Hollow and Solid Spheres (task 6) and by the Shooting of the Captain and His Son (task 19).

Special Knowledges

As in the case of extra abilities, so extra and special knowledges should be avoided or should be identified and when necessary, provided. Examples of this latter are Székely's tasks (tasks 1 to 6) in connection with which he sometimes asked the subjects for the required information, sometimes provided it, etc. In

the present realm of discourse. Cornell, in an unpublished Twelfth Quarterly Report on an Air Force contract, uses a "Tab Test" which is an analogue of a radar set, and is a printed test in which a trouble shooter can look for symptoms, make checks of components, etc. He finds that the behavior can be classified tentatively into such categories as efficiency, misinterpretation, precipitancy, caution. Whether or not these categories are eventually included in the final set, they are the general sort of thing that dimensions are—and they provide four different methods of scoring a task.

Marks' problem of the Incorrect Square Root (task 22), the subject has to be taught a special method for finding square roots before being able to work on the task at all. In the Pendulum Problem (task 7), Maier provided all the necessary "experience" and asked the subject to assemble it properly. Twenty Questions (task 21), on the other hand, is a case where the knowledge needed could never be specified. The Cylinder in the Can (task 20) gives an instance of information (that wood floats) which can be safely assumed to be within the repertoire of all of the members of many different groups of subjects. It has already been suggested (footnote 2) that perhaps some of Piaget's tasks (27) are tests of special knowledge rather than of reasoning.

Reliability

Problem-solving tasks, like any other experimental tasks, should be reliable in the usual statistical, test-construction meaning of that word, which is to say that the variance between subjects should be produced by features of the task and/or of the independent variable under examination, rather than by chance factors such as events during the period immediately preceding entrance to the experimental room. This matter of reliability is one which has never been solved very satisfactorily for experimental tasks, although the need has been apparent for many years (see Melton, 23), and is an exceptionally baffling question in problem solving where the subject frequently meets a task only once. Signs of an interest in reliability among the tasks described above appear (a) in connection with the Disc Transfer Problem (task 23), where correlations in the region of .10 are reported between scores on the problem with four discs

and with five discs; (b) in G. M. Peterson's reported split-half reliability of .95 with twenty highly similar tasks all involving the moments of a lever (task 29); and (c) in Deutsche's work (footnote 2). Unreliability of tasks will presumably not lead to unwarranted generalizations, but may result in failure to find relationships which would otherwise appear.

Validity

If by validity one refers to the question as to whether or not any one task really demands problem-solving behavior, the answer will lie in expert judgment and in definitions which can be described as expert judgment again. Identification of types of processes which occur in what experts agree to be problem solving will, in turn, add to the assurance of validity in future selection of tasks. As far as the individual experimenter is concerned, he can frequently avoid the question of validity by refusing to label his task as problem solving, describing it completely enough that anyone interested in the matter can make his own judgment. A more important question than the above is whether the behavior in question has any relation to any other kind of behavior, which brings us to the other definition of validity: the relationship of performance on one task to performance on another, for instance, the relation between performance on a test and performance on an equipment trouble-shooting job. The split-half reliability of a series of tasks is this sort of validity (task 29 and footnote 2).

The reader is again referred to Melton (23) for a more extended discussion of this topic.

TYPES OF SCORES USABLE IN PROBLEM-SOLVING TASKS

It is possible to make a list of vari-

ous ways of scoring problem-solving tasks, developing the list from the methods used in conjunction with the tasks themselves, from remarks made by other persons in other places, and from reflection on these sources. The simpler kinds of scores require no examples and some of the more complex ones have none.

Quantitative

Easily quantifiable

1. Success or failure
 - a. On the problem as a whole
 - b. On steps in a problem
 - c. On each of a series of problems
2. Error scores
 - a. Omits correct procedures, hypotheses, etc.
 - b. Uses correct procedures in the wrong places
 - c. Repeats correct procedures unnecessarily
 - d. Adds incorrect procedures
3. Time scores

Not as easily quantifiable

1. Assistance scores. This is a question of how many aids or hints were required to produce the solution and is therefore a sort of success or failure score. This sort of score was used by Maier, for instance with the Two String Problem (task 9) and with the Hat Rack (task 10), and was used by Reid (28) with Katona's Cut Pyramid (task 15).

2. Deficiency scores. How close to solution did the subject come? How many and how large were the steps yet to be taken?

3. Elegance and neatness of the solution. If there are two methods of solving the task does the subject take the shorter or easier or the one with the higher probability of success? This is the sort of scoring done in Twenty Questions (task 21) and is suggested in Burack's asking "Was

the problem clearly formulated by the subject?" (task 19). Deutsche's (footnote 2) use of a scale against which to compare written answers is an example of quantifying the elegance of "solutions."

Qualitative

1. Type of psychological process used in the solving; as, deduction, perceptual reorganization.

2. Content of the process; what deduction or what hypothesis does the subject use? Simmel does this in her experiment on Weighing the Coins (task 18) when she looks to see whether the subject is reacting on the basis of symmetry (having the same number of coins on each pan of the balance), totality (weighing all the coins simultaneously), or divisibility (dividing the coins into groups which will leave no extra, nongrouped coins).

3. Elegance of the solution process. Compare Wertheimer (38, p. 18) *et al.* on sensible procedures which evince some understanding of what is to be done, and blind procedures such as trying to apply a formula without first deciding whether the formula fits.

4. Deficiency scores. What necessary steps were omitted? There is a use of this sort of thing when Burack (The Shooting of the Captain and His Son, task 19) remarks (6, p. 12) "Her solution would be satisfactory except for ignoring. . ."

5. The nature of the error. This is the opposite of elegance of the solution process. Compare Duncker's (10, p. 6) meaningful and nonsensical errors and Köhler's (14, p. 203) good, uninformed, and stupid errors.

6. Content of the error; what specific errors appeared? There are many examples of these errors in the articles describing our tasks as when one subject wanted to put Bulbrook's

(task 17) balloon clear into the bottle and blow it up with a glass tube—except that there was no tube available. This would be a “good” error in the preceding category.

DISCUSSION

As one reads through the experimental literature of complex problem solving as defined by the sort of tasks included here, he is struck with the fact that many of these tasks have been of the parlor puzzle or game variety rather than being tasks constructed for experimental use, which is even more true in the problems which have been omitted than in those included. Such problems are frequently either too simple in that the solving process is a single, rapid response (and often a covert response), or too complex in that there are so many possible responses that the experimenter has little chance of identifying them. This, however, is as often true in the tasks designed for experiments as it is in those taken over from the parlor. The choice of such problems is presumably due to the many investigations made in this field which have been observational rather than experimental in their aim, although this is not so true today as it was in the past.

Few of the tasks described herein permit more than a two-category scoring system, success or failure, although some investigators have shown considerable ingenuity here. Reliability has been mentioned only

twice and validity never by the writers of the reports. Only seldom are all the cogitable apposite hypotheses listed, and cogitated inapposite hypotheses are sometimes stated, but a complete list of them for any one task has apparently never been offered.

There is a reiterated plea, especially in articles and chapters which summarize the state of the field of problem solving and reasoning, for more theory—a plea which has produced no great results. Perhaps a more modest sounding plea may be made. What this field needs are dimensionable independent variables, predictions of their effects on dimensionable dependent variables, and tasks especially designed to measure those effects. Once this is achieved, we can start to work on hypothetical constructs, perhaps using specific hypotheses as first order intervening variables and processes such as hypothesis formation by induction or deduction as second order variables.

From one point of view, research in problem solving is simpler than research in learning, in that in learning the experimenter predicts changes in responses, whereas in problem solving all he has to predict is the probability of occurrence of the response. From another point of view, however, it must be admitted that research in problem solving may be more difficult because a greater number of more complex, intervening variables may be needed here than in learning research.

REFERENCES

1. ADAMSON, R. E. Functional fixedness as related to problem solving: a repetition of three experiments. *J. exp. Psychol.*, 1952, 44, 288-291.
2. BATTERSBY, W. S., TEUBER, H. L., & BENDER, M. B. Problem solving behavior in men with frontal or occipital brain injuries. *J. Psychol.*, 1953, 35, 329-351.
3. BEASLEY, W. A miniature model of Yerkes' multiple-choice apparatus. *Amer. J. Psychol.*, 1931, 43, 497-498.
4. BIRCH, H. G., & RABINOWITZ, H. S. The negative effect of previous experience on productive thinking. *J. exp. Psychol.*, 1951, 41, 121-125.
5. BULBROOK, MARY E. An experimental inquiry into the existence and nature of “insight.” *Amer. J. Psychol.*, 1932, 44, 409-453.

6. BURACK, B. The nature and efficacy of methods of attack on reasoning problems. *Psychol. Monogr.*, 1950, **64**, No. 7 (Whole No. 313).
7. COFER, C. N. Verbal behavior in relation to reasoning and values. In H. Guetzkow (Ed.), *Groups, leadership and men*. Pittsburgh: Carnegie, 1951.
8. COFER, C. N., & GELFAND, S. The role of increased associative strength in reasoning: further report. Twelfth Technical Report under Contract N7-onr-397, T. O. III, Univer. of Maryland, 1952. Duplicated.
9. DEUTSCHE, JEAN M. *The development of children's concepts of causal relations*. Minneapolis: Univer. of Minnesota Press, 1937.
10. DUNCKER, K. On problem-solving. *Psychol. Monogr.*, 1945, **58**, No. 5 (Whole No. 270).
11. ERICKSEN, S. C. Variability of attack in massed and distributed practice. *J. exp. Psychol.*, 1942, **31**, 339-345.
12. GUETZKOW, H. An analysis of the operation of set in problem solving behavior. *J. gen. Psychol.*, 1951, **45**, 219-244.
13. KATONA, G. Eine kleine Anschauungsaufgabe. *Psychol. Forsch.*, 1927, **9**, 159-162.
14. KÖHLER, W. *Mentality of apes*. New York: Harcourt, Brace, 1925.
15. KRUGLAK, H., SCHENSTED, C. E., & SELF, H. C. An electric multiple choice maze. Technical Report Number 2 under Contract N8onr-66213, Project NR192-041, Univer. of Minnesota, 1952. Duplicated.
16. LINDLEY, E. H. A study of puzzles with special reference to the psychology of mental adaptation. *Amer. J. Psychol.*, 1897, **8**, 431-493.
17. MAIER, N. R. F. Reasoning in humans: I. On direction. *J. comp. Psychol.*, 1930, **10**, 115-143.
18. MAIER, N. R. F. Reasoning in humans: II. The solution of a problem and its appearance in consciousness. *J. comp. Psychol.*, 1931, **12**, 181-194.
19. MAIER, N. R. F. An aspect of human reasoning. *Brit. J. Psychol.*, 1933, **24**, 144-155.
20. MAIER, N. R. F. Reasoning in children. *J. comp. Psychol.*, 1936, **21**, 357-366.
21. MAIER, N. R. F. Reasoning in humans: III. The mechanisms of equivalent stimuli and of reasoning. *J. exp. Psychol.*, 1945, **35**, 349-360.
22. MARKS, M. R. Problem solving as a function of the situation. *J. exp. Psychol.*, 1951, **41**, 74-80.
23. MELTON, A. W. The methodology of experimental studies of human learning and retention: I. The functions of a methodology and the available criteria for evaluating different experimental methods. *Psychol. Bull.*, 1936, **33**, 305-394.
24. PETERSON, G. M. An empirical study of the ability to generalize. *J. gen. Psychol.*, 1932, **6**, 90-114.
25. PETERSON, J., & LANIER, L. H. Studies in the comparative abilities of whites and negroes. *Ment. Measmt Monogr.*, 1929, Serial No. 5.
26. PETERSON, J. C. The higher mental processes in learning. *Psychol. Monogr.*, 1920, **28**, No. 7 (Whole No. 129).
27. PIAGET, J. *The child's conception of physical causality*. New York: Harcourt, Brace, 1930.
28. REID, J. W. An experimental study of "analysis of the goal" in problem solving. *J. gen. Psychol.*, 1951, **44**, 51-69.
29. SAUGSTAD, P. Incidental memory and problem solving. *Psychol. Rev.*, 1952, **59**, 221-226.
30. SHAW, MARJORIE E. A comparison of individuals and small groups in the rational solution of complex problems. *Amer. J. Psychol.*, 1932, **44**, 491-504.
31. SIMMEL, MARIANNE L. The coin problem: a study in thinking. *Amer. J. Psychol.*, 1953, **66**, 229-241.
32. SZÉKELY, L. Knowledge and thinking. *Acta Psychol.*, 1950, **7**, 1-24.
33. SZÉKELY, L. Productive processes in learning and thinking. *Acta Psychol.*, 1950, **7**, 388-407.
34. TAYLOR, D. W., & FAUST, W. L. Twenty questions: efficiency in problem solving as a function of size of group. *J. exp. Psychol.*, 1952, **44**, 360-368.
35. Terman, L. M. Genius and stupidity. *Ped. Sem.*, 1906, **13**, 307-373.
36. WATERS, R. H. The influence of tuition upon ideational learning. *J. gen. Psychol.*, 1928, **1**, 534-549.
37. WEAVER, H. E., & MADDEN, E. H. "Direction" in problem solving. *J. Psychol.*, 1949, **27**, 331-345.
38. WERTHEIMER, M. *Productive thinking*. New York: Harper, 1945.
39. YERKES, R. M. A new method of studying the ideational behavior of mentally defective and deranged as compared with normal individuals. *J. comp. Psychol.*, 1921, **1**, 369-394.

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SPECIAL REVIEW

RECENT BOOKS IN CHILD PSYCHOLOGY

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- BAKER, HARRY J. *Introduction to exceptional children*. New York: Macmillan, 1953. Pp. xvi+500. \$5.00.
- CROW, LESTER D., & CROW, ALICE. *Child psychology*. New York: Barnes and Noble (College Outline Series), 1953. Pp. xvi+267. \$1.50.
- CRUZE, WENDELL W. *Adolescent psychology and development*. New York: Ronald Press, 1953. Pp. xii+557. \$5.00.
- DAVIDSON, AUDREY, & FAY, JUDITH. *Phantasy in childhood*. New York: Philosophical Library, 1953. Pp. viii+188. \$4.75.
- GANZ, MADELAINE. *The psychology of Alfred Adler and the development of the child*. (Trans. by Philip Mairet.) New York: Humanities Press, 1953. Pp. xxiv+203. \$4.50.
- HALPERN, FLORENCE. *A clinical approach to children's Rorschachs*. New York: Grune and Stratton, 1953. Pp. xvi+270. \$6.00.
- HURLOCK, ELIZABETH B. *Developmental psychology*. New York: McGraw-Hill, 1953. Pp. x+556. \$6.00.
- JERSILD, ARTHUR T. *Child psychology*. (4th Ed.) New York: Prentice-Hall, 1954. Pp. xii+676. \$6.00.
- MARTIN, WILLIAM E., & STENDLER, CELIA BURNS. *Child development: the process of growing up in society*. New York: Harcourt, Brace, 1953. Pp. xxiv+519. \$4.75.
- MOUSTAKAS, CLARK E. *Children in play therapy: a key to understanding normal and disturbed emotions*. New York: McGraw-Hill, 1953. Pp. x+218. \$3.50.
- PECK, LEIGH. *Child psychology: a dynamic approach*. Boston: D. C. Heath, 1953. Pp. vi+536. \$5.25.
- STOLZ, LOIS MEEK, & COLLABORATORS. *Father relations of war-born children*. Stanford, Calif.: Stanford Univer. Press, 1954. Pp. viii+365. \$4.00, paper.
- WOLFFHEIM, NELLY. *Psychology in the nursery school*. (Trans. by Charles L. Hannan.) New York: Philosophical Library, 1953. Pp. 144. \$3.75.
- ZUBEK, JOHN P., & SOLBERG, PATRICIA ANNE. *Human development*. New York: McGraw-Hill, 1954. Pp. viii+476. \$6.00.

Introduction

A special review is presumed to represent, among other things, the reviewer's vectorial description of the field for the period covered by the review; i.e., where is the field moving? This review covers the 14 books (12 hardbacks, two paperbacks) available to the reviewer. They fall into five classes:

First, child and developmental psychology, four volumes (Crow and Crow, Jersild, Martin and Stendler, and Peck). Two volumes of human development (development during the entire age span, and for Zubek and Solberg, the phylogenetic series) are also included here (Hurlock, and Zubek and Solberg). There is a single volume on adolescence (Cruze). All seven books are designed as texts.

A second class has to do with ex-

ceptional children, one volume (Baker) which is also intended as a text.

Third, three volumes can be classified as being clinical or other applications of child psychology. Two of the volumes deal with children's fantasy (Davidson and Fay, and Moustakas) and one with their Rorschachs (Halpern). In the sense of a distinction made below, all can be considered child psychology.

The fourth class, one volume, is a research monograph (Stolz and co-workers) and would be classed as child psychology. The fifth class, two volumes, might be labeled psychoeducation (Ganz and Wolffheim).

These 14 books encompass about 5,900 pages and do not include the newest revision of Carmichael (2). In one sense, all are psychological in intent. Most of the American authors are listed in the APA directory, and the purpose of each book seems to be to present a picture (varying in completeness) of children's behavior development with the goal of guiding it in the direction of a better child and adult adjustment. It is true that physical growth, anthropological, and sociological material is included in all the texts, but the ultimate intention of such inclusion is to increase the understanding and control of behavior.

The reviewer would like to present a tentative distinction between child development and child psychology. It is possible to study the child from many points of view (e.g., nutritionally, in terms of growth, anthropologically, psychologically, sociologically). A child *development* text draws from several or all of these fields, although most child development personnel are classified professionally as psychologists. Strictly speaking, a child *psychology* text

draws only from the psychological area. Historically, child development studies and texts have been practically and pragmatically oriented. Their goals are those implicit in the volumes in classes 1 and 2. In this sense, all the volumes in classes 1 and 2 are child development, not child psychology texts.

In the same sense, the three volumes in class 3 and the research monograph in class 4 are child psychology since they draw from traditionally psychological materials and methods (e.g., fantasy, projective techniques, the influence of certain learning conditions on personality development). Their emphasis is more that of understanding than of controlling behavior.

There are two types of intellectual affiliation typical of child psychologists: the traditional child development affiliation, and the general psychology affiliation. The first is desirable for practical reasons, if no other than that it has been the historical pattern: in this field, in their teaching, service, and research functions, child psychologists mingle with many disciplines and are confronted with many practical questions; the average research center using children as subjects is multidisciplinary, etc. The second affiliation is equally desirable but is less characteristic than the first of professional personnel in the field. The goal of the science of psychology is to understand behavior and the goal of these volumes and of child psychologists in general is to understand the behavior of children. A divorce between general and child psychology is self-defeating for all concerned.

There are certain indications that the authors of these volumes (and child psychologists in general) have not even entered into a marriage with

general psychology, let alone being at the divorce stage. Their preoccupation appears to be with the child as a special subject of study in his own right; it is not with the child as an organism whose behavior, studied systematically, will add scope and precision to the subject matter of the science of psychology. These goals are not mutually exclusive by any means; rather they are richly supplementary. Professionally, neither psychology nor child psychology (a merely practical distinction) can afford not to strive toward both of them.

Illustrative of this criticism of these 14 books is the fact that most of the material in them is pragmatic and nonsystematic. This is less a criticism, of course, of the authors than of the profession, past and present. Nevertheless, there is a tendency to omit from the texts some of the more important theoretically based psychological studies. For example, four studies (1, 4, 5, 6) were not reported by any of the authors although the datelines indicate that they were available in the literature at the time all the textbooks were being written. Is this because three of the four were published in the *Journal of Experimental Psychology*? Is it because all four articles are systematic and theoretical rather than descriptive in intent? Surely the subject matter of the studies (discrimination learning and transposition, secondary reinforcement and perceptual learning, and compensatory behavior as a function of implied parent-child relations) is important.

With the exception of the Martin and Stendler text, theoretical matters are treated scantily if at all; the same is true, with the same exception, of sociological and anthropological liter-

ature. Only Jersild adopts an ordering frame of reference (the self theory as represented by Sullivan and others).

The appearance of two volumes dealing with over-all human development is new for the field. If such greater span of coverage results in perspective and increased systematization, the addition seems desirable. If it results only in increased, encyclopedic cataloguing of normative information without coherent frames of reference, no advantages accrue.

Encouragingly, the texts as a group pay more attention to methodology and questions of research adequacy than has been true traditionally, although there are some exceptions to this tendency.

It is difficult to say anything as a class about the special clinical and application volumes. They are variable in quality and their principal value seems to be technical and practical. Some intriguing research possibilities are opened up by the psychoanalytic educational paradigms suggested by Ganz and Wolffheim.

Most of the volumes reviewed here can be criticized in spots for one or more of the following common errors. An attempt has been made to classify and illustrate these errors, which are frequent not merely among the authors of the present volumes but for psychology authors in general. Some of such flaws, of course, are inherent in the process of compiling material and making it comprehensible.

A first flaw is poor analysis, in terms of the philosophy of science. Illustratively: "Whenever young children are placed in favorable environments results of intelligence tests tend to rise, but it is very doubtful whether

this is a real rise in mental level or a spurious change due to the nature of testing materials" (Baker, p. 238).

Martin and Stendler (p. 193) ask analogous questions re IQ changes: "Are such changes *real*? Do they really represent changes in the intellectual level of the children involved?"

With reference to these quotes, and others similar are present in most of the texts, we might say that if an increase in intelligence test scores is accompanied by increases in other performances with which it (intelligence test score) is positively correlated, then in the only meaningful sense of the term "real," the changes are real.

A second type of error consists of overgeneralization from available data. Illustratively: Hurlock (p. 13) states, "... learning must wait upon maturity. Trying to teach a child something before he is ready will invariably lead to failure. This will be accompanied by a resistant attitude on the child's part to further learning in the same area or even in related areas. As a result the child will not learn what he is capable of learning when a state of readiness occurs."

This quote is selected because it reflects the considerable preoccupation with the issues of maturation-learning (and heredity-environment) common to most of the texts. The value issues around these questions are moderately handled in all cases; but most of the authors show some unclarity which should by now have been dissipated by familiarity with the philosophy of science. This is to say: with our present methods (which are determined by the essential inviolacy of human unions and the human organism) we cannot con-

struct designs which make it possible to answer the relevant questions empirically (e.g., one cannot put one identical twin in isolation, the other in a maximally stimulating environment; babies up for adoption *are* selectively placed; selective mating is not possible; training to the extent of possible damage to the child is socially and legally impossible). Zubek and Solberg, in analogies from animal research, deal most sophisticatedly with such issues.

Through the texts runs the thread of the classical maturation-learning studies (e.g., the Gesell and McGraw twins). The conclusions from these that the effects of early training are minimal are accepted by most of the authors, as they are by Hurlock. Other lines of evidence are not considered: e.g., the Fels studies suggest profound personality and intellectual effects resulting from parental accelerationism; scattered reports exist concerning the later personality development of the twins in question as a possible result of their differential early training; research published in abstract by Farber and Russell (3, 8) suggests, actually, transitory effects upon learning of rather severe failure, albeit with adult subjects.

An additional illustration of this criticism is supplied by Baker (p. 168): "... Sheldon notes some parallels between body type and temperament, which throw new light upon the general nature of temperament and disposition." There is no further discussion of this point, which was selected because it is common to others of the texts. Again (p. 322) Baker implicitly attributes schizophrenia to heredity.

A third common flaw of these volumes is a failure to distinguish between "guidance" or "social re-

form" writing and writing which is definitely research based. This is done in these books in two ways: frequently legitimately, with clear indications given that the author is speaking from common sense, or his own beliefs, or his own experience. Such usage is common in Ganz, Wolffheim, Jersild, and Peck. In other cases, research is incompletely presented, then socially valued passages follow, giving the unsophisticated or unwary reader the illusion that he is perusing scientific material. Illustrative of this not uncommon flaw, and by no means the most extreme of the possible illustrations, is Jersild's section on prejudice in Chapter 9. The section is faulty scientifically, but is a strongly written social document with which, ideologically, few readers would disagree. Jersild does not make clear, however, that the evidence in the prejudice area is conflicting, nor that personality-prejudice relations are most tenuously established. He has omitted some relevant recent research. In other words, considerable lecture amplification of the section would be required.

Another flaw, less conspicuous in the "application" volumes than in most of the texts, is the standard treatment of fantasy and daydreaming. In what is commonly considered to be an "extroverted" culture such as ours, these behaviors are commonly condemned at least by implication. Most of the textbook authors have adopted such a point of view; none of them has considered Lewin's (7) original and provocative handling of the subject, where fantasy and level of unreality become important behaviors for research and their necessity for normal development is systematically mapped out. Their economy function as set forth

by Freud and implicitly by Sears has been likewise neglected.

Few of such criticisms can be made of the following volumes: Martin and Stendler, Moustakas, Stolz and co-workers, and Zubek and Solberg.

With greater frequency, these criticisms apply to the following volumes (not to a degree implying rejection of the book as a whole, but simply in the sense of an alert lecturer being required for certain sections): Crow and Crow, Cruze, Hurlock, Jersild, and Peck.

Flaws such as summarized above appear most frequently in the books by Baker (in his general, not his practical sections), Davidson and Fay, and Halpern. A reader should be extremely alert in his perusal of these last two volumes.

Because of their intention such criticisms are not particularly relevant to the Ganz and Wolffheim books.

Specific Reviews

Crow and Crow in their *Child Psychology* present what they purport to: a standard outline of material in the area in greatly condensed form. There are reference tables keyed to 14 general topics as covered in 17 standard texts in child psychology and development. The organization is topical. The book is sound enough within the limits the authors have set for themselves, although it suffers from condensation and lack of qualification.

Jersild's *Child Psychology* is by and large an admirable book. One feels, reading it, that Professor Jersild has become sufficiently satiated with the vast body of unrelated material in the area that he has struck out determinedly to look for relating concepts (in his case a version of self-theory). He has not used it con-

sistently and rigorously in all sections of this revision. Since the theory suffers from some inadequacy of definition, it could probably not be so used. But for this field, the reviewer believes that "half a loaf is definitely better than none."

In Jersild's chapters on emotional development, he makes the most concerted attempt to integrate the material by means of his self theory. These chapters are in part unabashedly non-data bound, and are full of provocative clinical hypothesizing. Jersild, one might almost say, has provided the first new paradigm for child rearing (the "development of the self" paradigm) since the Freudian. Approached as a research source rather than as gospel, such a paradigm could be helpful to the field.

Martin and Stendler's *Child Development* is an excellent volume in general. There is striking use of pictorial and verbal illustrations, including delightful cartoons. The last three of four topical sections are superior, the first more standard. Scientific caution is generally exercised; rather fresh sociological and anthropological material is introduced in these latter sections; and essentially sound theoretical treatments of the process of socialization and personality formation are included. The authors espouse no particular theory. The book is well designed for intelligent lay readers and there are sections from which the professional reader can gain both pleasure and intellectual reward.

Peck's *Child Psychology* is on the whole a delightfully written, very simple book with as wide a range of interesting and illustrative anecdotes about children as the reviewer has seen.

It is a practical, guidebook type of volume, presumably for undergradu-

ates. Space precludes any relaying of specific content criticisms, of which there are several. There is, throughout the later sections of the book, a heavy emphasis on the psychologist as the potential solver of all child and child-adult problems. The role of other "remedial" professions is perhaps underplayed. The book is very sound for being as simply and pleasantly written as it is.

Zubek and Solberg's *Human Development* is a scholarly and professional work. Written, as the authors state, with a physiological (but non-theoretical) emphasis, it is nevertheless psychological in a constructive sense. Psychological and social determinants of behavior are handled in a sophisticated manner. The book is readable, well organized, moderate. Research is critically considered and conclusions are tempered and sound. Considerable material not in common currency in the United States is introduced and the chapter on motor development is particularly outstanding. Intellectual development is well handled, with some new material introduced. Classical and recent animal research is adduced in the intellectual development and other chapters. The authors seem most at home as well as most creative in the physiological, sensory, motor, and intellectual areas (through Chapter 10 of the total of 15 chapters). The last five chapters (emotional, social development, etc.) are more traditional in their content and organization. The book is a constructive addition to the literature.

Hurlock's organization of *Developmental Psychology* is basically cross-sectional (each chapter takes up a range of topics for a given age range). This has led to one amusing chapter title sequence: Chapter 13, "Old Age (Sixty Years to Death)"

is followed by 14, "Old Age (Continued)." In contrast to Jersild's optimism, Hurlock takes as a theme Hollingworth's quote, "The ultimate goal of development is death" (p. 1).

The last section of Chapter 1, "Happy and Unhappy Ages in the Life Span," is one of the most remarkably pessimistic summaries of life since Dostoevsky. A hereditary emphasis is adopted for personality. But on the other hand, "No longer is it necessary to adopt a 'wait and see' policy in the training and education of children, as it was in the past. Instead, it is now possible to plan ahead in the training of children. This puts education and child training on a firmer foundation than it ever has been before" (p. 18). This quote speaks for itself.

Generally speaking, the later or maturity and aging sections of the book are more appealing than the earlier ones, and throughout the problem of sexual development and behavior is well handled. The material in earlier sections is standard, with some overlapping due to the cross-sectional organization. There is some lack of critical discrimination between studies.

Cruze's *Adolescent Psychology and Development* is standard fare, topically arranged and generally not unsound. The "Sturm und Drang" or "out-of-the-continuum" nature of adolescence is stressed. It is assumed that the reader will have had no previous training in psychology. For instance, the physiological bases of "emotion" section rests entirely upon a detailed treatment of the Cannon theory.

Baker's *Introduction to Exceptional Children* is a revision of his 1944 volume. The book is a point of departure for a course in special and remedial education. The sections on

the rapid learning and the mentally gifted supply an emphasis frequently lacking in the special education area. Dr. Baker shows his greatest strength when dealing with practical issues.

Davidson and Fay's *Phantasy in Childhood* contains many reports of children's fantasy, viewed according to Melanie Klein's "breast-guilt-infantile-masochism" version of psychoanalytic theory. The children whose fantasies are related in the book apparently all belong to extremely intellectual, Kleinian oriented families in the British Isles. Instructors in the field of child development or clinical psychology can find interesting illustrative fantasies here, and the book contains certain practical tips for guiding children. There is also some interesting material on the development of fantasy.

Moustakas' *Children in Play Therapy* contains primarily therapy protocol from play sessions with normal or moderately "maladjusted" young children. Moustakas is a nondirectivist, theoretically and methodologically. The book should be read with the Davidson and Fay book reviewed above. The contrasts in content of the reported children's verbalizations are very sharp and delineate, at least by inference, the influence of the reporter or "stimulator" of the child's verbal behavior. The bulk of the protocol material concerns one case, and is excellent illustrative material for teachers or workers in the field. There is little dogma or overgeneralization in the book. It is practical, and the children's protocols sound precisely like children in play sessions. It is one of the few sources of detailed play protocol for normal children.

Halpern has written *A Clinical Approach to Children's Rorschachs*. If students must learn to give Ror-

schachs to children, this book provides a number of protocols and condensed histories and diagnoses. The book partly reviews itself: "What is offered here is what has 'worked' . . . The question arises whether it might not be advisable to delay this communication until all the suggestions offered are subjected to rigorous experimental investigation. The answer is that publication would never occur . . . methods for validating certain aspects of the Rorschach procedure and the meaning of many of the test factors are yet to be discovered" (p. vii).

The procedure advocated by Halpern for the Rorschach, although it reveals her own wide experience, is sufficiently loose to allow the examiner's theoretical or personal biases infinite leeway in determining the results of the test. The primitive, "direct analogue" Rorschach interpretation method is espoused by the author: "The center figure alone, like all midline figures, is extremely likely to be a reflection of the way the individual sees himself" (p. 46). Response modes revealing anxiety and repression are operationally indistinguishable (pp. 58, 59). Literature on such matters as color shock and examiner influences is ignored, although much of it was in print at the presumed time of writing. Statements about shading responses and anxiety are confusing; schizophrenic children are said to be without good form responses, but so also are *all* children of certain ages.

Stolz and her co-workers (*Father Relations of War-Born Children*) have broken much ground in the almost totally unexplored territory of father-child relations. Any worker in the field should read the monograph for this reason if no other. Briefly, the study uses interviews, observations,

and projective techniques with mothers, fathers, and children. There are 19 families in the experimental group, and variable control groups depending on the area of study. Essentially, fathers away from home at the time of and for more than 10 months following the birth of their first child seem to be "problem" fathers and children thus launched into life seem to have more difficult adjustments, at least in their early years, than children born into "complete" families. Some criticisms of design, particularly group matching, could be made, but notwithstanding, the results are convincing. Some of the "clinical" and interview material is vividly illustrative. Interpretation is in general conservative.

Ganz (*The Psychology of Alfred Adler*) and Wolffheim (*Psychology in the Nursery School*) have written two interesting psychoeducational books. These are not primarily intended as a contribution to scientific literature, but represent efforts on the part of the authors to apply principles which for them are consistent with the theoretical formulations of Adler and Freud, respectively, to educational practices. Ganz writes with reference to the public schools of Vienna, the elementary and secondary levels, after the first world war, Wolffheim of nursery schools. The books should be read together.

Their contrasting principles can be roughly summarized thus: Ganz: guide children; don't just let them flower. Not immediate experience but eventual adult adjustment is the important thing. Guidance is done through letting children learn through experience the consequences of their own behavior. Wolffheim: Children must be helped to adjust through finding substitute satisfaction for their wishes. They should not be

dominated, even by love. Implicitly, catharsis alone is a helpful mechanism for sound personality development. Formal organization has no place in nursery schools. Teachers must consider and recognize their own motives for working with young children. These motives are likely to be complex.

Additionally, Ganz's book, written in 1935 but only recently translated, is a moving historical document.

Postscript

The preceding pages indicate that,

in the reviewer's opinion, there are some bright and some relatively dark spots in the child psychology field as it is represented by these 14 volumes. He believes that a more encouraging picture of the field of child psychology (i.e., one more characterizable as progressive and alive in the scientific and philosophical sense) is presented by the current journals, the program of the 1954 American Psychological Association, and critical and evaluative comments as they have appeared in relevant chapters in the *Annual Review of Psychology*.

REFERENCES

1. ALBERTS, C. A., & EHRENFREUND, D. Transposition in children as a function of age. *J. exp. Psychol.*, 1951, **41**, 30-38.
2. CARMICHAEL, L. (Ed.) *Manual of child psychology*. New York: Wiley, 1954.
3. FARBER, I. E., RUSSELL, W. A., & ANDREAS, B. G. Effect of failure upon performance in verbal and motor learning situations. *Amer. Psychologist*, 1949, **4**, 351. (Abstract)
4. HARLOW, R. J. G. Masculine inadequacy and compensatory development of physique. *J. Pers.*, 1951, **19**, 312-323.
5. KUENNE, MARGARET R. Experimental investigation of the relation of language transposition behavior in young children. *J. exp. Psychol.*, 1946, **36**, 471-490.
6. LAMBERT, W. W., SOLOMON, R. L., & WATSON, P. D. Reinforcement and extinction as factors in size estimation. *J. exp. Psychol.*, 1949, **39**, 637-641.
7. LEWIN, K. *Dynamic theory of personality*. New York: McGraw-Hill, 1935.
8. RUSSELL, W. A., & FARBER, I. E. Retention of verbal material as a function of degree of failure experienced in original learning. *Amer. Psychologist*, 1948, **3**, 355. (Abstract)

BOOK REVIEWS

MASLOW, A. H. *Motivation and personality*. New York: Harper, 1954. Pp. xiv+411. \$4.50.

JONES, M. R. (Ed.) *Nebraska symposium on motivation, 1954*. Lincoln, Nebr.: Univer. of Nebraska Press, 1954. Pp. x+322. Cloth, \$3.50. Paper, \$3.00.

To be properly appreciated Maslow's book must be read as a protest, an eloquent and at times almost prophetic protest against the traditional homeostatic conception of drives which has held American motivational theory in a strait jacket ever since our psychological forebears first read Darwin. Maslow rightly sees that even men as apparently different as Freud and Hull were essentially the same in one respect. They both were tremendously influenced in their outlook by the doctrine of evolution, and they both accepted the view that motives were essentially tensional states that the organism tried to eliminate. Maslow objects to such an oversimplified view. In particular, he wants to stress what might be called the "day view" as compared to the "night view" of personality. Thus, he is more interested in need gratification than in need deprivation, in self-actualization than in neuroticism, in healthy rather than sick people, in purposeless behavior rather than instrumental behavior, in art rather than work, in laughter rather than anxiety, etc. Many of the chapters have appeared before in psychological journals and some of them have already influenced current thinking about motivation. As a catalog of deficiencies of traditional motivational theory, they probably have no equal, and they should certainly be

read by those graduate students (and perhaps only by them) who feel that they can compass the facts of motivation easily in some simplistic deductive way from a few simple primary drives. It will only anger such students, but perhaps anger is the first step to doing something about the problem.

Like most protests, I feel that it falls short of eloquence on the constructive side. Serious motivational theorists have long known that the problems Maslow describes so eloquently and lists *in extenso* in an appendix as worthy of research ought to be investigated. The problem is not naming them but discovering how they can be attacked both empirically and theoretically. His research contributions, like his clinical study of self-actualizing, extraordinarily healthy people, leave one a little less than satisfied. He cannot, for obvious reasons, name the contemporaries he has considered to be self-actualizing, but he can list some historical figures. Here trouble begins. Someone is sure to point out that nearly all his really "healthy" people are "liberals" or heroes of the liberals, from Lincoln and Debs to Eleanor Roosevelt. Perhaps it is true that only people of certain political convictions can be truly self-actualizing or that self-actualizing people tend to have certain political opinions, but just raising the question makes one wonder whether the judgment of self-actualization depends in any way on one's own values or on the cultural era in which the judgment is made. In short, I think the idea of studying healthy rather than sick people—an idea which Murray first put into practice

over twenty years ago—is an excellent one, but it involves some tough theoretical issues that Maslow seems to avoid rather too easily. Those hardheaded scientists who are sure to be annoyed by his eloquence and the cavalier way in which he treats hard theoretical problems would get more out of the book if they treated it as a protest against current theorizing rather than as a closely reasoned contribution to the construction of an alternative theory. As a brilliant protest, it is full of stimulating ideas which, if we can find ways of absorbing them into our science, are bound to make an important contribution to the psychology of motivation.

It is particularly interesting to juxtapose the current *Nebraska Symposium on Motivation* with Maslow's book. To what extent are the points Maslow makes applicable to the six contributions to this Symposium? The comparison demonstrates that some of what he has to say is already dated. Appropriately enough the Symposium opens with a contribution by Farber which represents, more or less, the traditional drive-reduction theory at which Maslow aims most of his artillery, but it ends with a paper by Nissen, who, on the basis of his work with primates, objects just about as strongly as Maslow does to traditional psychological theory about motivation. It is perhaps important to note that both Maslow and Nissen, as well as other critics like Hebb and Harlow, have worked primarily with primates rather than with rats at the animal level. It begins to look as if the theory one accepts depends on the animal one studies. As Maslow says, though, if theorists must pick an animal to think in terms of, why choose the wolf (as Freud does)? Why not the doe or the friendly chimpanzee? In all seriousness, it begins to look as

if the rat, which may be an ideal laboratory animal for studying learning, is very inadequate as far as studying motivation is concerned because of its extremely limited repertoire of innate appetites and aversions. And certainly species differences are much greater in motivation than in learning.

But the critics do not take all the honors. A comparison of Nissen's paper with Farber's or with Ritchie's carefully reasoned treatment of the thirst drive in terms of symbolic logic inevitably suggests that while criticism is a part of science, it is not science building itself. One wishes somehow for a middle ground in which the objectors to current motivational theorizing would do some careful system building of their own. In fact, the preference for a tight and orderly system which is obviously incorrect in some details vs. the preference for a flexible approach to concrete facts without too much system strongly reminds me of the distinction Klein makes in his contribution to the Symposium between the "constrictive controls" and the "flexible controls." What science needs is someone who can be both flexible and constrictive. Not too surprisingly I find that Atkinson's extraordinarily complete summary of recent work on the achievement motive seems to avoid overconstrictive "blindness" on the one hand and flexible confusion on the other.

Taken as a whole, the Nebraska Symposium is impressive evidence that the study of motivation is in a vigorous and healthy state. There is not only the important controversy between the traditional drive-reduction theorists and the newer "instinctivists" but there is also a wealth of significant empirical research on different kinds of motives. For example, Festinger reports here some concrete data on the drive to know ac-

curately one's environment, including one's social environment. All that I miss in this exciting research is a concern for measuring individual differences in this particular motive. Atkinson reports extensive research on the achievement motive, carefully integrating it with expectancy theory. Farber is pressing ahead with a questionnaire measure of the anxiety drive, although he is not sure that it is a drive or that he has a measure of it, and neither am I. Klein is working empirically at the interaction point between what Farber would call habit and drive, or what he, himself, would call drive and the method of cognitive control. Nissen has provided us with much valuable concrete observational material on the drives that seem to activate primates. Ritchie is kibitzing on how we should go about our research, and kibitzers have a place in science, irritating though they may be to those who think they are getting along quite well without advice as to how to do research. Furthermore the Symposium permits several of the authors to comment on each other's papers—a most useful idea. In fact I found myself regularly reading the comments before reading the paper itself. For one who grew up in a day when psychology was practically defined as being co-terminous with the psychology of learning, I find all this activity gratifying, and it should lead to important improvements in our ideas about human motivation.

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ESTES, WILLIAM K., *et al.* *Modern learning theory. A critical analysis of five examples.* New York: Appleton-Century-Crofts, 1954. Pp. viii + 379. \$5.00.

This book is the product of the Dartmouth summer conference on

learning theory, held in the summer of 1950 under the auspices of the Social Science Research Council, with funds supplied by the Carnegie Corporation.

Each of the five sections is devoted to one learning theorist (Hull, Tolman, Skinner, Lewin, and Guthrie). The authors have followed a guiding outline for evaluating each theory, including a discussion of the structure of the theory (its delineation of empirical area and its theoretical constructs), methodological characteristics (types of formal model used, techniques of derivation), and, finally, an over-all appraisal of empirical content and adequacy. According to a division of labor among those who attended the conference, individual authors or pairs of authors took responsibility for a given theory, and they have taken responsibility for the sections as they are now written, though of course what is included must reflect to some extent the give and take that went on at Dartmouth. There is no comment on the separate chapters by those who did not author them, so if there were disagreements or minority opinions, these are not reflected in the book.

The chapters move at a high level of sophistication with respect to the logic of theory construction. While the criticisms are often negative in tone, the intent, as indicated in the introduction, is "entirely constructive," that is, the authors look forward to the advance of learning theory beyond the temporary stage that any one contemporary theory must represent. The book should prove very useful to the advanced student. The beginner, who is making his first acquaintance with the theories, might be troubled by the extreme scepticism, and become cynical about the possibility of doing anything of consequence in such a

muddled field. He needs additional acquaintance with the ingenuity which these same theorists have displayed in their empirical work, even though their general theories are vulnerable to attack.

Because a critical review of these chapters to be adequate would have to be long, I shall attempt no more than a brief characterization of each. The issues raised in the book will undoubtedly be challenged and discussed separately by those friendly to the various theories.

Hull (by Koch). This 176-page review constitutes nearly half the book. It is based largely on *Principles of Behavior* (1943), although the changes represented in *Essentials of Behavior* (1951) are recognized and discussed, and there is an appended note on the posthumous book, *A Behavior System* (1952). It is unfortunate that the last book could not have been given more adequate treatment, but Koch believes that the 1943 version of Hull's system is likely to remain as the most influential one.

Koch pretty successfully demolishes any claim that Hull succeeded in doing what he set out to do, to develop a system with intervening variables "securely anchored on both sides to observable and measurable conditions or events." He concludes that there is no single case in which intervening variables are actually securely anchored, and that it is impossible to relate any one intervening variable to another "with sufficient determinacy to permit quantitative passage from one to the other" (p. 160). Nevertheless, Hull is credited with doing more than anyone else to put this kind of enterprise on a realistic basis. We do most honor to him if we learn the lessons from his failures, and move on with his vision as to what a science of behavior ought to be.

Tolman (by MacCorquodale and Meehl). The chief difficulty in dealing adequately with Tolman's system is that it has remained programmatic for 20 years, lacking the specificity which makes a more pointed criticism of Hull possible. This lack is compensated for in part by an ingenious effort on the part of the authors to provide a postulate set coherent with Tolman's position, an S_1 - R_1 - S_2 psychology, in which a stimulus (S_1) eliciting a response (R_1) leads to the expectation of a stimulus (S_2).

Skinner (by Verplanck). Reliance is chiefly on the system as expounded in *The Behavior of Organisms* (1938), and nothing after 1950 is quoted. The purely descriptive outlook proposed by Skinner makes it proper to call his position a theory rather than a system; it is characterized as formal but not formalized and as quantifiable but not quantified. A kind of paradox is detected in respect to prediction:

... it is possible to find no predictions at all of the behavior of rats, or of pigeons, when novel combinations of stimuli are presented to them in the Skinner-box, and many predictions among Skinner's writings with respect to human behavior in a social environment (p. 311).

In general, Skinner avoids generating propositions that may be put to experimental test. Hence some of the criteria of system, applicable to the other writers, are inapplicable to Skinner, at least from his own point of view.

Verplanck appears a little hasty in attributing the success of Skinner and his followers in animal training to "engineering-wise" control, and in considering the successes irrelevant as tests of the adequacy of the theory (p. 272). He similarly believes the experimental productivity to be a tribute to the systematist rather than

to his system. One might wish a somewhat further exploration of the possibility that Skinner's position is more closely related to these successes than Verplanck implies.

Lewin (by Estes). The general conclusion is that Lewin failed to construct a field theory, because he was satisfied with a symbolic representation of a situation, and failed to seek precise relationships between variables. Hence there is no adequate field theory to criticize. The ultimate criticism that the theory has not influenced learning experimentation is not quite fair to it. The many experiments on level of aspiration, on the remembering and forgetting of unfinished and finished tasks, on ego involvement and task involvement, on the resolution of conflict, can be classified as learning experiments, and they arise out of the kinds of pre-occupations that Lewin's point of view engenders. The possibility must be considered that the area staked out by the typical S-R experiments is too narrow, rather than that Lewin is "too different."

Guthrie (by Mueller and Schoenfeld). Much of the discussion concerns Guthrie's failure to specify clearly the basic terms in his theory, namely, stimulus and response. The content of the system turns out not to be simple, but actually rather formidable; the authors believe that "many reviews in the literature have mistaken incompleteness for simplicity" (p. 368). The failure of Guthrie's account to become more rigorous since he first announced it leads to conjectures as to why it remains prominent. The authors make four points: (a) a monistic system such as his is appealing; (b) he and his students have been good critics; (c) he hit upon some ideas which others have developed, for which he then (deservedly) gets the credit, and

(d) his theory flourishes in part because reinforcement theory flourishes alongside it, sometimes contrasting with it, sometimes indistinguishable from it.

The critical task which the authors set themselves was admirably done, and we may be thankful for it. The homogeneity in conception of what constitutes a good theory reflects in part the homogeneity of background of those who found it congenial to meet together. They undoubtedly felt heterogeneous enough, yet all of them had been immersed, at one time or another, in the theories of either Hull or Skinner, and in operationism or logical positivism. That this did not produce a tempering of criticism is shown by the severity of the judgments upon the theories of Hull and Skinner, but even so it must have influenced the tasks the conference members set themselves, and the enthusiasm with which they carried out these tasks. Let us grant that a different book would have been written had a different conference been assembled, with theorists initially more sympathetic to other viewpoints. There is nothing to prevent such a new conference, and if it does as well as this one, it will have been of genuine service to contemporary psychology.

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TINBERGEN, NIKO. *The herring gull's world*. New York: Frederick A. Praeger, 1953. Pp. xvi+255. \$4.00.

This book summarizes in nontechnical language a large number of observations and experiments by the author and his students on the behavior of herring gulls. Primary emphasis is placed upon social behavior including formation of breeding pairs, establishment and maintenance of a

territory, courtship and mating, and rearing of young. Many of the experiments have been reported before and some of them will be familiar to American readers of the international journal *Behaviour*. The theory of behavior which is developed in skeleton form in this volume has been set forth more explicitly in Tinbergen's earlier book, *The Study of Instinct*.

The Herring Gull's World achieves several objectives very effectively. First, it presents a clearly drawn picture of the behavior of gulls in their natural environment. Second, it illustrates authoritatively a method of analyzing behavior which differs in several important ways from techniques used by American psychologists. Third, the book exemplifies an attitude or philosophy of behavior study quite unlike that of experimental psychologists.

Concerning the empirical findings little can be said in a brief review. They are of considerable intrinsic interest and would supply any lecturer in psychology with a wealth of amusing and useful illustrative examples. It seems, for instance, that the story of gulls carrying clams to a great height and then dropping them on rocks which shatter the hard shell and leave the meat exposed is entirely true; and this behavior is not uncommon. However, it is equally true that birds will drop the bivalves on soft mud and repeat this ineffective response a dozen or more times in succession.

The methods described in the book differ from the typical American approach to animal behavior in several ways. In the first place, all observations are made in the field under conditions involving the least possible interference with the animal's normal activities. In the second place, specific reaction patterns such as the brooding of eggs or feeding of young

are not studied as isolated bits of behavior, but are analyzed in terms of their relation to all other elements in the bird's reproductive performance and the total behavioral repertoire. Although primary emphasis is placed upon the prolonged and detailed observation of undisturbed gulls, simple controlled experiments are often conducted, particularly in connection with attempts to discover the sensory stimuli involved in various responses. Thus, the sensory basis for retrieving of displaced eggs was determined by studying the reaction of broody pairs to artificial eggs of different sizes, shapes, and colors. The stimuli that evoke the feeding response in which young birds take food from the parent's bill were determined by presenting nestlings with models of adult heads having bills of different shapes and markings. In these experiments, incidentally, it was found possible to create artificial eggs and imitation heads which elicited the normal reaction even more effectively than did the normal stimuli.

The approach to behavior exemplified by Tinbergen's latest book is in general teleological and phylogenetic. It is representative of the philosophy of those students of behavior who call their specialty "ethology," and who concentrate primarily upon the analysis of behavior of wild (undomesticated) animals living in their natural state. The first insistence is upon the development of observational techniques adequate to provide as complete as possible a knowledge of the total behavioral repertoire of the species under examination. Not until such a description is reasonably complete is it considered permissible or expedient to begin a more detailed analysis of separate items in the repertoire such as nest building or food getting.

The ethological approach is teleo-

logical in that it involves the assumption that structural and behavioral characters serve some function; and one goal of research is the elucidation of the functional significance of various behavioral responses. This point of view derives quite naturally from a basic concern with the evolution of behavior. Behavior is both an effect and a cause of evolution. Not content with understanding behavior in the herring gull, the ethologist wants to know how it compares with the behavior of other species of gulls, and in particular he is desirous of tracing its probable evolutionary history.

This general interest in the total behavior pattern, its functional significance and phylogenetic background, and particularly the insistence upon protracted field observations seems to generate a special attitude of the scientist toward his animal subjects. Or it may be the other way around—perhaps the attitude precedes and dictates the special interest and method. In any event, many ethologists, and Tinbergen is an excellent example, are emotionally attached to the animals they study. When the scientist is capable of literary expression, his attachment to his subjects lends charm to his writings. This is certainly the case in *The Herring Gull's World*. The author's enthusiasm for behavior study combines with his long-standing affection for sea gulls to produce an eminently readable, entertaining, and informative volume, the attractiveness of which is enhanced by numerous excellent photographs of gull behavior.

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GILLIN, JOHN. (Ed.) *For a science of social man*. New York: Macmillan, 1954. Pp. vii+289. \$4.00.

As the title and authorship indicate this is another in the line of re-

cent symposia intended to work toward integration in the social sciences. The plan of this book is unique. Each of three disciplines—psychology, sociology, and anthropology—is represented by two prominent theoreticians. Each of these men discusses some of the theoretical elements which could be held in common by his discipline and one of the sister disciplines (frequently one with which he has also been identified). Thus psychology and sociology are discussed by Newcomb and Parsons, anthropology and psychology by Brewster Smith and Hallowell, and sociology and anthropology by Murdock and Becker. Gillin contributes an introductory and a concluding chapter.

While each chapter is said to be the product of joint authorship, there is relatively little integration, and the authors vary considerably in the manner in which they undertake to fulfill their tasks. For example, Becker and Hallowell devote much of their efforts to wise summaries of the interweaving of the histories of the disciplines they discuss, which they conclude by pointing to the future. Murdock gives us an overview of the strengths and weaknesses of sociology and anthropology; Smith discusses convergences in interests; Newcomb discusses concepts which might provide bridges, while Parsons considers the potential usefulness of various psychological theories to sociology, particularly Parsonian sociology.

In his discussion of "Anthropology and Psychology," Smith stresses the influence of the concept of culture on the general orientation of psychologists, but points out the need for concepts which are more differentiated than "culture" and "personality."

What are the differentiated bridge concepts which psychologists might well use? Newcomb stresses three:

role, consensus, and communication. The concept of role is necessary to sociologists because it points to uniformities at one or another collective level without regard to continuities of specified organisms. "To the psychologist, the role concept is attractive because it points to behavior on the part of individuals," and because the role as perceived by the role taker is an important intervening variable in the prediction of interpersonal behavior. Since role behavior varies with perceived consensus, both sociologists and psychologists are interested in the concept of consensus. The communicative act, Newcomb's third bridge concept, is important as a means of studying interaction processes.

Of equal interest to psychologists is the evaluation of psychological concepts and theories by representatives of other disciplines. Parsons uses at least *six* criteria, with which a useful psychological theory should deal: (1) the relationship of individual behavior to the meanings of objects, especially social objects, (2) an analysis of the elements of structure in the situation of action, (3) the organization of behavior in systems, (4) the structure of situations and personality as organized over time, (5) the distinction between structure and process, (6) the fact that action phenomena are made up of systems within systems.

Using these criteria Parsons sees psychoanalytic theory as coming out ahead of instinct theory, behaviorism, and Gestalt theory in usefulness to sociology.

Hallowell, too, stresses the contribution of psychoanalytic theory but ventures the prediction that the peak of its stimulation to anthropology has passed and that the fruitful influences of the future will come from other lines of current development in

psychology, particularly those which help in the understanding of the potentialities for novelty in human life.

There is relatively little integration between chapters, yet, looking at the book as a whole, one is impressed not only by the scholarship of the authors, each of whom seems to have unusual command of his own and neighboring fields, but also with their general good will. In fact the reader is sometimes amused by the general tendency of a writer to be more critical of his own field than of his neighbor's. For example, the anthropologist Murdock, says, "The scientific superiority which sociology enjoys over anthropology is perhaps most obvious in the field of methodology." The sociologist Becker, on the other hand, writing about the limitations of methods says, "Anthropology has thus far been saved from being swamped by procedures akin to those now threatening to overwhelm the sociologist only because of its stress on 'real research' stemming from its long and sound field work tradition."

As Gillin points out, "No one can say with certainty when or if we shall have a comprehensive and integrated science of social man." While this volume does not answer the "when," it enables the viewer to regard the "if" with considerable optimism. While the book does not bring to light a large number of bridge concepts such as those discussed by Newcomb, it does indicate a number of important areas of mutual concern which can be approached in a non-competitive fashion. This makes for stimulating reading.

A postscript: If you hope to refer to concepts covered by several authors, don't expect any help from the index. There is none.

W. J. McKEACHIE

University of Michigan

WOLBERG, LEWIS R. *The technique of psychotherapy*. New York: Grune & Stratton, 1954. Pp. xiv+869. \$14.75.

Most of the published material on psychotherapy has dealt with theoretical justification, the goals of therapy, generalizations of what should be accomplished and why, but relatively little on specifically how to do it. This is not the case with *The Technique of Psychotherapy*. It provides one of the most remarkably comprehensive discussions of specifically what to do in psychotherapy that is currently available. The range and specificity of the topics covered is truly astounding. At least 38 of the 53 chapters deal with concrete, specific problems in the practice of psychotherapy. The topics covered deal with almost every conceivable question that the beginning therapist might ask an expert. The range includes such topics as estimating prognosis, the therapeutic use of dreams, dealing with inadequate motivation, indications of overly strong countertransference, opening the initial interview, techniques of interpretation, dealing with broken appointments, translating insight into action, handling nonpayment of bills, suggesting termination, inviting the patient back into therapy, dealing with relatives, handling resistance, and terminating unsuccessful therapy. This is only a random sample of the many topics discussed.

This book is remarkable not only in the comprehensiveness of its coverage of specific aspects of therapy but also in the flexibility and freedom of dogmatism of the writer. Wolberg's position appears to be best described as eclectic-psychoanalytic. His actual preference for method, as indicated by the many illustrative sections of recorded interviews and the one complete nine-interview

short-term case that is presented, seems to be for a fairly active role for the psychotherapist as contrasted with either the orthodox psychoanalytic point of view or the non-directive point of view. In this sense, his technique is closer to the Adlerian approach than to the Freudian. But Wolberg has something good to find in all varieties of psychotherapy. Insight therapy, catharsis, re-education, environmental manipulation, support, reassurance, hypnosis, dream interpretation, free association, and persuasion all have their place for different kinds of therapy and for different kinds of cases.

It is in this broadness of view, this tolerant eclectic attitude, that lie the weaknesses and strengths of this book. The discussion of different kinds of therapy are descriptive rather than critical or analytical. The terminology of the book is what may now be called the everyday terminology of practical psychiatry which is for the most part a loose terminology and one involving vague and overlapping referents. The theoretical sections are consequently the weakest, and a relatively large section dealing with kinds of therapy for different types of patients verges on typological overgeneralization. Although the book describes in detail what to do, it does not go into why it is being done. It is inevitable that, in a field such as that of psychotherapy where so relatively little is known, there are many unwarranted taboos, superstitions, and stereotypes which are hard to justify either empirically or systematically. It is undoubtedly true that Wolberg falls prey to some of these, but the overwhelming impression of the book is that it is one of good, sound common sense. It does an excellent job of communicating the extensive experience of a skilled and thoughtful psy-

chotherapist. It will be of considerable aid and comfort to the beginning student of psychotherapy and the less experienced therapist, and there is much in it that will be valuable to anyone who practices the art of psychotherapy.

The absence of a systematic personality theory explicitly stated does leave many gaps for the psychotherapist. Questions the therapist will have such as, "Why should he use one technique rather than another?" "When should he use them?" "How can he predict the effect of his behavior?" "What kinds of goals should he set up for himself and the patients?" etc., cannot readily be resolved by reading this book. To do therapy one must have more than the specific, concrete suggestions that Wolberg is able to pass on. Which suggestions to accept and which to reject, when to use one rather than another, and how much of current methods is inefficient are questions which may only be answered now by the psychotherapist by application of a systematic approach to personality which he must obtain elsewhere, and ultimately by research.

Psychologists will be interested in a brief section on "who should do psychotherapy" in which the arguments for and against the practice of psychotherapy by clinical psychologists are stated pretty much in non-judgmental form. The book is clearly written in a simple and direct style which helps to overcome its considerable length. Four hundred and eighty-one references are given.

To the extent that this book sets out to be a description of the specific, concrete techniques of psychotherapy in current use, it is eminently successful. It will be useful in teaching psychotherapy and as a reference for those who practice psychotherapy. Although many therapists will

disagree with one or another of the specific suggestions made by Wolberg for handling particular problems, his suggestions, obviously born out of experience and good common sense, can never be dismissed lightly.

JULIAN B. ROTTER

The Ohio State University

SARASON, SEYMOUR B. *The clinical interaction: with special reference to the Rorschach*. New York: Harper, 1954. Pp. x+425. \$5.00.

Clinical psychologists who use the Rorschach technique have been sorely criticized by their more experimentally oriented colleagues for failing to take into account the numerous Rorschach research studies. The use of the Rorschach as a psychodiagnostic instrument still seems to be based upon the original, pre-experimental statements of Rorschach and some of his disciples, with little or no attention paid to those investigations that have attempted to validate such statements. Sarason's effort to handle this problem of integrating research findings with the clinical use of the Rorschach will help answer these criticisms and will bring the Rorschach closer to the main body of contemporary empirical psychology.

The present volume is not, however, a research compendium but is rather a detailed presentation of several carefully selected studies, including some unpublished investigations from the Yale laboratories, as well as the implications of these studies for Rorschach interpretation. Of the multitude of Rorschach studies, the author has selected fewer than one hundred for mention or discussion. One fortunate outcome of this selection is that many studies with equivocal results, inadequate design, etc. are excluded. On the other hand, many readers will search in vain for

studies that they regard as especially relevant or significant to the problem under discussion.

According to the author, "This book stems from the belief that practically all clinical problems are concerned with data obtained from an interpersonal interaction and that regardless of how interactions differ certain variables are always operative and must be taken into account" (p. 2). The patient's overt behavior, the instructions, the stimulus complex, the patient's previous experiences in similar situations, and the psychologist's behavior are discussed as such *universal* variables. The author then attempts to analyze Rorschach behavior in terms of each of these variables. For example, each of the usual Rorschach determinants is discussed as part of the stimulus complex; each determinant is first defined, usually following Klopfer's scoring scheme, the classical interpretative statements are then given, followed by a summary of the relevant research. Each such section concludes by suggesting modifications in interpretation and by pointing out unsolved problems that necessitate additional research.

The final section of the volume begins with a rather uneven discussion of psychic determinism, the purposiveness of behavior and the defense mechanisms. The graduate students and professional clinical psychologists for whom this volume seems intended will find much of this section quite elementary. The last chapter presents six complete Rorschach protocols together with Sarason's response-by-response, card-by-card interpretation. This is done in an attempt to spell out the interpretive process and represents a courageous beginning to our understanding of the psychology of the *Rorschacher*.

The author's pro-Rorschach bias

occasionally leads him to conclusions that others might find unacceptable. This bias is clearly seen in the treatment of the Rorschach indices of performance under stress (pp. 149-155); Meyer Williams' original investigation is presented here as evidence of the Rorschach's capacity to predict such performance. While the several unsuccessful attempts to cross-validate Williams' findings are also discussed, the reader comes away with the impression that Sarason is rather unimpressed with these failures, and Williams' results are substantially unchallenged. One less favorably disposed toward the Rorschach certainly might come to an entirely different conclusion.

Despite the above criticisms, the present volume represents a significant contribution to the literature of the Rorschach and general clinical psychology. The psychologist who would like to have a more solid empirical basis for his clinical use of the Rorschach ought to regard this book as required reading.

LEONARD D. GOODSTEIN

State University of Iowa

GANNON, TIMOTHY J. *Psychology: the unity of human behavior*. New York: Ginn, 1954. Pp. xii+482. \$4.75.

This volume is an introductory textbook of psychology for college students. In addition to a somewhat different organization of the material and a different emphasis accorded to various topics Gannon's book introduces certain theoretical considerations which are not ordinarily found in most textbooks.

The book is divided into four parts: The first part, the shortest, is a general introduction. It treats of the historical development of psychology, its definition, and presents a brief survey of the structure and

function of the nervous system. The second, entitled "Reception," deals with sensation and perception. The author, in discussing perception, particularly stresses the neural correlates of perception and the localization of functions in the brain. The third, "Response," contains the discussion of reflexes, drives, and emotions. The fourth and last part, "Integration," is the longest, constituting almost half of the book. The topics included in this part are imagery and dreams, learning, memory and attention, the measurement and nature of intelligence, will and volition, and personality. The book is illustrated throughout with well selected pictures, diagrams, and graphs. The style is simple, the exposition clear, making the text easy reading for the student.

The principal concern of the author is to present all experiences, and all behavior, as integrated manifestations of a single living person. A stress on unity characterizes the book. This emphasis is a consequence of the author's view of psychology, which is reflected in his definition of psychology: "the study of the whole range of human experience and behavior insofar as it manifests the reactions of a single, living person to changes within himself and in his environment" (p. 27). Not only does the author emphasize man's unity, organize the contents of the book around this concept, and endeavor to demonstrate unity in the variety of man's reactions, but he also offers a concept of man to explain this unity of man's behavior. He refers to the Aristotelian philosophy and view of man's nature. Convinced that Cartesian dualism and psychophysical parallelism have greatly harmed psychology, and that what psychology now needs most of all "is some principle of

unity" (p. 18), he points to the Aristotelian concept of *entelechy* and *hylomorphic* doctrine as a sound philosophical basis for the psychological treatment of man. There will be readers who will object to Gannon's introduction of philosophical considerations, but others will welcome the opportunity of acquainting themselves with the Aristotelian explanation of man's unity.

Later in the book the author examines another theoretical issue of importance for psychology: the problem of determinism in psychology. Gannon believes that the discussion of will and volition belongs to psychology, and that the hostility of modern psychologists toward these topics stems from the influence of mechanism in psychology and the assumption of psychological determinism. "The most damaging effect of this hostility," says the author, "towards volition is the manner in which it has forced psychology to deny facts that it cannot explain in terms of existing viewpoints." "What psychology," he continues, "or any other discipline, must do, if it is to retain its title to respect as a science, is to welcome all the facts that have been observed and then attempt to explain them. To date, the efforts of experimental psychology to explain the will have amounted only to attempts to explain it away" (p. 395). In discussing determinism the author, however, may not have distinguished clearly enough for the student the assumption of determinism as a method of science from determinism as a philosophical doctrine. The entire book is characterized by an effort to present to the student not merely a survey of psychological problems and known facts about man but to provide him at the same time with a concept of

man's nature which would serve as a key to the understanding of man as such. It clearly aims to be a guide to the study not of some isolated aspects of man's behavior and experience but of the whole man.

HENRYK MISIAK

Fordham University

BRAATØY, TRYGVE. *Fundamentals of psychoanalytic technique*. New York: J. Wiley, 1954. Pp. xi+404. \$6.00.

Braatøy, a slightly off-beat psychoanalyst, writes as a facile essayist, drawing on a vast fund of intriguingly patterned knowledge, often careless with words in his first approximations, but showing profound thoughtfulness and meticulous patience in setting forth his material. The material itself will be of variable interest to most psychologists. For example, many will find it difficult to consider the couch in psychoanalysis as seriously as he does. It should be added that he makes the couch, the position of the analyst, the movement of the analysand's neck muscles, the type of head rest, the advantages of allowing the patient to lie on the floor and kick, the crossing of the legs, and a hundred other details, fascinating material for his unstrained but provocatively serious consideration. He has observed, thought about, formulated and reformulated his ideas against a background of intense interest, broad scholarship, and sound clinical sophistication.

Other themes may, however, spark more response than the analytic couch: The analyst as a focus of interest rather than the patient; the detailed relation between motor, physiological, and verbal behavior; the concept of intricate nonverbal communication; the role of time in personality change; and the distinc-

tion between neurotic symptoms and neurotic traits—none of these are new topics, but Braatøy demonstrates unusual clarity in presenting specific implications and concrete meaningfulness.

His approach will have little appeal to those psychologists who are interested only in the most crabbed and minimal conclusions based on the most rigorously denatured evidence. His book is, however, a fascinating development in the gradually emerging *rapprochement* between those analysts who are completely unconscious and those psychologists who permit themselves to think only with the 10 per cent of their iceberg minds that maintains a bobbling existence above sea level.

Braatøy quotes Boring, Eysenck, and Lashley as readily as Ferenczi, Fenichel, and Wilhelm Reich. With equal familiarity he draws on history, philosophy, literature, physiology, and his own intensive experience with patients. He has studied in the Berlin Psychoanalytic Institute, the Salpêtrière in Paris, the Menninger Foundation, and chiefly in Norway. He has, moreover, lived with an awareness of customs and people beyond his work with patients. His thinking seems to have grown slowly and carefully; yet he does not try to arrive at an arithmetic sum of his knowledge that equals a given set of conclusions.

While much of the book lacks the authority of firmly established evidence, its purpose is more to consider implications that go beyond the evidence. Not all of the sections are of equal calibre, and the over-all product cannot be offered as an ideal example of "intuitive" writing from a background of wide knowledge. It does often achieve a provocative combination of unusual scholarship and

painstaking speculation. Braatø's early death in 1953 before the publication of the book is regrettable.

ROY M. HAMLIN

Western Psychiatric Institute and Clinic, University of Pittsburgh

GINZBERG, ELI, HERMA, JOHN L., & GINSBURG, SOL W. *Psychiatry and military manpower policy*. New York: King's Crown Press, Columbia Univer., 1953. Pp. xi+66. \$2.00.

In 1950, General Dwight D. Eisenhower established the Conservation of Human Resources Project at the Graduate School of Business at Columbia University. The present volume reports one aspect of the continuing study of human resources being made by this group in which the staff of the project brought into focus opinions of a group of distinguished psychiatrists who had attempted to deal with a number of insistent military manpower problems at the request of the project directors.

During World War II, almost a million men were rejected from military service because of psychiatric defects and an almost equal number were separated prior to demobilization because of emotional instability, ineptitude, or undesirable traits of character. It is reported that there is rather general agreement among the psychiatrists queried that the case history of the individual, including his school, work, and social adjustments, is more important than any evidence of tensions shown during a brief medical or psychiatric examination.

A suggestion is made that the psychiatric standards set during World War II were too high. Rejections, it is proposed, might be made on the basis of demonstrated incapacity to adjust to civilian life rather than on

any diagnostic label that may be applied to a man.

The question of why men broke during military life is answered in the volume in an interesting way. It shows that psychiatrics have moved far from the simple premise held by some physicians early in the war that each breakdown was a function of a demonstrable personality defect. It is now recognized that stress and "support balance" in the environment are important. Leadership and group morale are also significant in causing or preventing breaks.

Adjustment in military and in civilian life is compared. The replies to this question by the psychiatrists who knew military life intimately were diverse. The authors conclude that one of the important tasks for further research in this area is a better understanding of the factors that contribute to or interfere with a successful civilian as well as military life.

The volume contains many specific suggestions for the saving of manpower. The importance of further research is emphasized.

LEONARD CARMICHAEL

Smithsonian Institution

BRAY, DOUGLAS W. *Issues in the study of talent*. New York: King's Crown Press, Columbia Univer., 1954. Pp. xi+65. \$2.00.

The present volume contains a foreword by Eli Ginzberg, director of the Conservation of Human Resources Project at Columbia University.

It is pointed out that the unusually talented person has always attracted the attention of many groups of individuals but that similar study has not been given to the people who range through the whole spectrum of human abilities. In considering the part played by the hereditary poten-

tial in general intelligence the author concludes, in briefest terms, that individuals differ in intellectual potential at birth, but that differences in IQ among children from different socioeconomic cultural groups may be due to differences in cultural opportunity. In order to determine the amount of hereditary potential in a population it is necessary, therefore, to correct for differences in cultural opportunity. It is suggested that if cultural opportunities were about equal for all, the percentage of individuals with high IQ's in a favored cultural group might pertain to the population as a whole.

The importance of factor analysis in the study of human abilities is emphasized as is also the significance of studies of motivation and work performance. Much emphasis is given to an analysis of two basic motives, the desire of the individual to do well in school and his desire to reach a particular socioeconomic goal. A design for the study of talent and of superior performance is worked out in the volume.

The present small book will be of interest to those who are concerned with the fundamental question of the causal factors that underlie the individual differences which characterize those who make up our present-day society.

LEONARD CARMICHAEL

Smithsonian Institution

SAPPENFIELD, BERT R. *Personality dynamics*. New York: Knopf, 1954. Pp. xiv+428. \$5.50.

Drawing from the best of modern work in the areas of phenomenology, learning theory, field theory, and especially psychoanalysis, the author has done a very skillful job of integrating the whole into a generally readable text on the psychology of

adjustment. A strong point in favor of the book is the liberal (albeit sometimes too liberal) quotations from original works and his own very adequate interpretations of them. The text deals with the usual topics of personality dynamics—motivation; developmental aspects of personality; frustration and conflict; aggression and related problems; anxiety, guilt, and inferiority feelings; and repression and other ego-defense mechanisms.

The author has attempted to clarify some of the classical formulations, such as those of id, ego, and superego. Although some may not agree with the exact equating of anxiety with biogenic needs which do not possess acts or objects for their gratification, the attempt to explain the nature of anxiety with these needs as a base is of particular interest. Of greater value is the author's probing consideration of the various explanations of anxiety. He considers the standpoints of orthodox analysis, neo-analysis, maturation, and learning theory, and attempts to integrate them into his own viewpoint. This integration, which provides for an explanation of anxiety as a clearly drawn developmental sequence, is a gratifying contribution to the more serious student who may have been baffled by various attempts to explain this most central concept.

Whereas the style of the text is readable, it is by no means easy. The quotes from original sources, plus the author's own theoretical evaluations, place the book in a dubious position from the standpoint of its use as an introductory offering in courses in adjustment or mental hygiene. Although illustrations are usually adequate, there are times when more liberal usage of them would enhance the discussion. For example, the au-

thor states, "The individual develops a self-concept of adequacy or self-confidence when he has had frequent success in regard to positive motives; he develops a self-concept of security when he has had frequent success with respect to negative motives" (p. 36). Although positive and negative motives are discussed, there is room for clarification of this point by concrete illustration. Again, whereas experimental work is often cited, there are times when the author may appear dogmatic, as to wit, his statement (p. 95) that a child who has never had love is less frustrated than the child who has had it and lost it. It would seem that there should be corroborative evidence for such statements.

An impressive asset of the book is the carefully concise summaries at the end of each chapter, and a glossary consistent with textual terminology. There is no doubt that we have here a well thought out volume which is certainly among the best that this reviewer has seen in recent years.

RALPH D. NORMAN

The University of New Mexico

INGHAM, H. V., & LOVE, L. R. *The process of psychotherapy*. New York: McGraw-Hill, 1954. Pp. ix+270. \$5.00.

In the preface the authors state "This book is an attempt to describe the ways in which a psychotherapist works. . . . Anyone engaged in psychotherapy is concerned with both an understanding of people and an appreciation of the ways of dealing with them. Certainly much more consideration has generally been given to a presentation of dynamic theory or to using the advantages of combining both fields than to efforts at describing how psychotherapy is conducted.

It is our feeling that there has been a need for a treatise which is centered on the activities involved and is relatively free of other material. The comprehension of psychotherapy and of personality is, of course, not ultimately separable. But it seems to us that it is justified for practical purposes to address ourselves primarily to the procedural aspects. It then follows that we have made no attempt to introduce dynamics of personality except where immediately necessary. . . ."

The authors have been singularly successful in avoiding raising and discussing problems either of "dynamic theory" or the relation of theory to psychotherapeutic practice. It is this success which raises the following question: Can (should?) psychotherapy be taught or learned without some explicit discussion of the principles or dynamics of behavior? For example, how helpful or practical is the following to the student: "As an analyzer one becomes alert to note significant gestures, inflections, and silences. All people give innumerable indications of their feelings, but most of the emotions occur in restrained, abortive fashion in a civilized adult. With practice, though, the therapist can become sensitized to the presence of a great many indicators. When their importance is recognized, then occurrence is surprisingly easy to spot" (p. 73). *How* does the student determine the dynamic significances of silences—on what basis does he deduce the covert from the overt?

It is difficult to evaluate this book because we are not told for whom it is intended. It certainly is not a book for the specialist, and this reviewer is frankly puzzled about the kind and level of student who could benefit from it.

SEYMOUR SARASON

Yale University

BOOKS AND MONOGRAPHS RECEIVED

- ANCONA, LEONARDO. *La psicologia sociale; negli stati uniti d'America*. (Pubblicazioni dell'Universita Cattolica del S. Coure, Vol. XLV) Milano: Societa Editrice "Vita e Pensiero," 1954. Pp. xi+154. 1000 Lire.
- BAUMAN, MARY K. (Ed.) *Adjustment to blindness*. Harrisburg: Division of Documents, Department of Property and Supplies, Commonwealth of Pennsylvania, 1954. Pp. xiii+198.
- BELLAK, LEOPOLD. *The thematic apperception test and the children's apperception test in clinical use*. New York: Grune & Stratton, 1954. Pp. x+282. \$6.75.
- BRAND, HOWARD. (Ed.) *The study of personality*. New York: Wiley, 1954. Pp. xvi+581. \$6.00.
- COLEMAN, LESTER L. *Freedom from fear*. New York: Hawthorne, 1954. Pp. 285. \$3.95.
- COOPER, L. F., & ERICKSON, M. H. *Time distortion in hypnosis*. Baltimore: Williams & Wilkins, 1954. Pp. ix+191. \$4.00.
- DRESSEL, PAUL L. (Ed.) *Evaluation in general education*. Dubuque: Wm. C. Brown Co., 1954. Pp. viii+333. \$4.00.
- DRESSEL, P. L., & MAYHEW, L. B. (Eds.) *Critical thinking in social science*. Dubuque: Wm. C. Brown Co., 1954. Pp. vii+36. \$1.25.
- DRESSEL, P. L., & MAYHEW, L. B. (Eds.) *General education; explorations in evaluation*. Washington, D. C.: American Council on Education, 1954. Pp. xxiii+302. \$3.50.
- DRESSEL, P. L., & MAYHEW, L. B. (Eds.) *Handbook for theme analysis*. Dubuque: Wm. C. Brown Co., 1954. Pp. v+78. \$1.50.
- DRESSEL, P. L., & MAYHEW, L. B. (Eds.) *Science reasoning and understanding*. Dubuque: Wm. C. Brown Co., 1954. Pp. vii+223. \$3.50.
- EVANS, JEAN. *Three men; an experiment in the biography of emotion*. New York: Knopf, 1954. Pp. xviii+297. \$3.75. (Text Edition, \$2.75.)
- GREGORY, C. C. L., & KOHSEN, ANITA. *Physical and psychical research; an analysis of belief*. Surrey: The Omega Press, 1954. Pp. ix+213. 15 s. net.
- GROSS, FELIKS. *Foreign policy analysis*. New York: Philosophical Library, 1954. Pp. xxiv+179. \$3.75.
- HENRY, ANDREW F., & SHORT, JAMES F., JR. *Suicide and homicide*. Glencoe, Ill.: The Free Press, 1954. Pp. 214. \$4.00.
- KELLER, FRED S. *Learning; reinforcement theory*. Garden City: Doubleday, 1954. Pp. ix+37. \$85.
- KARDINER, ABRAM. *Sex and morality*. New York: Bobbs-Merrill, 1954. Pp. 266. \$3.00.
- KERMAN, EDWARD F. *What is electroshock therapy?* New York: Exposition Press, 1954. Pp. 152. \$3.50.
- KING, H. E. *Psychomotor aspects of mental disease*. Cambridge: Harvard Univer. Press, 1954. Pp. xiv+185. \$3.50.
- KUGELMASS, NEWTON I. *The management of mental deficiency in children*. New York: Grune & Stratton, 1954. Pp. xii+312. \$6.75.
- LEWIS, HILDA. *Deprived children*. New York: Oxford Univer. Press, 1954. Pp. xvii+163. 9S. 6d. net.
- LINDZEY, GARDNER. (Ed.) *Hand-*

- book of social psychology. Cambridge: Addison-Wesley, 1954. Volume I. *Theory and method*. Pp. x+588. Volume II. *Special fields and applications*. Pp. x+601-1226. \$15.00 (set), \$8.50 (one volume).
- LOWENFELD, MARGARET. *The Lowenfeld mosaic test*. London: Newman Neame, 1954. Pp. 349+index (with 144 colored plates in separate container). 50 S. net.
- MISIAK, HENRYK, & STAUDT, VIRGINIA M. *Catholics in psychology*. New York: McGraw-Hill, 1954. Pp. xv+309. \$5.00.
- MURPHY, G., & BACHRACH, A. J. *An outline of abnormal psychology*. (Rev. Ed.). New York: Random House, 1954. Pp. ix+597. \$1.45.
- OESER, O. A., & EMERY, F. E. *Social structure and personality in a rural community*. (Vol. II of *Studies of social behavior*.) New York: Macmillan, 1954. Pp. xiii+279. \$3.75.
- OESER, O. A., & HAMMOND, S. B. (Eds.) *Social structure and personality in a city*. (Vol. I of *Studies of social behavior*.) New York: Macmillan, 1954. Pp. xxiii+344. \$4.50.
- PFUETZE, PAUL E. *The social self*. New York: Bookman Associates, 1954. Pp. 392. \$4.50.
- PIÉRON, HENRI, et al. *L'utilisation des aptitudes*. (Livre troisième de *Traité de psychologie appliquée*.) Paris: Presses Universitaires de France, 1954. Pp. ix+416. 1.500 fr.
- RÉVÉSZ, G. (Ed.) *Thinking and speaking*. Amsterdam: North-Holland Publishing Co., 1954. Pp. 205. \$4.00.
- SCHAFER, ROY. *Psychoanalytic interpretation in Rorschach testing; theory and application*. New York: Grune & Stratton, 1954. Pp. xiv+446. \$8.75.
- SOAL, S. G., & BATEMAN, F. *Modern experiments in telepathy*. New Haven: Yale Univer. Press, 1954. Pp. xv+425. \$5.00.
- STANTON, ALFRED H., & SCHWARTZ, MORRIS S. *The mental hospital*. New York: Basic Books, 1954. Pp. xx+492. \$7.50.
- WOLFENSTEIN, MARTHA. *Children's humor; a psychological analysis*. Glencoe, Ill.: The Free Press, 1954. Pp. 224. \$3.75.
- ZISKIND, EUGENE. *Psychophysiologic medicine*. Philadelphia: Lea & Febiger, 1954. Pp. 370. \$7.00.

7

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